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Pacific
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Eldorado National
Forest and
Lake Tahoe Basin
Management Unit

January, 1997

Desolation Wilderness Management Guidelines

Draft Environmental Impact Statement

ABSTRACT

This Draft Environmental Impact Statement (DEIS) documents the results of an analysis of six alternatives which have been developed for possible management of the 63,691 acre Desolation Wilderness. The Desolation is located in the Sierra Nevada, California, and is jointly managed by the Eldorado National Forest and the Lake Tahoe Basin Management Unit. Alternative 1 emphasizes recreation use of the wilderness. Alternative 2 (No Action) would continue current management of the Desolation. Alternative 3 places an emphasis on enhancement of the primitive recreation experience of users through lowered use in specific areas. Alternative 4 reduces use, with an emphasis on improved wilderness social conditions and physical restoration of ecosystems. Alternative 5 reduces use further and places increased emphasis on resource protection and a return to natural ecosystem conditions. Alternative 6 places the most stringent controls on human influences in order to return the Desolation to its most natural condition. A preferred alternative has not yet been selected. Based upon public comment received, the preferred alternative may combine elements of the six alternatives displayed and analyzed in this document. The analysis in this DEIS will lead to a decision that either adopts new management guidelines or continues existing management (No Action). The decision to adopt new management guidelines will result in an amendment to the Land and Resource Management Plans for the Eldorado National Forest and the Lake Tahoe Basin Management Unit, providing consistent direction for management of the Desolation Wilderness.

REQUEST FOR COMMENTS

Comments must be received at the Eldorado National Forest Supervisors Office no later than 4:30 pm on April 4, 1997. Written comments can be addressed to:

Desolation Wilderness Management Guidelines
Eldorado National Forest
100 Forni Road
Placerville, CA 95667

Further:

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments one at a time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v Hodel* (9th Circuit, 1966) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This summary provides a condensed version of the Purpose and Need, Issues, and Alternatives portions of the Desolation Wilderness Management Guidelines Revision Draft Environmental Impact Statement (DEIS).

PURPOSE AND NEED

The Eldorado National Forest and the Lake Tahoe Basin Management Unit (LTBMU) propose to revise the management guidelines for the Desolation Wilderness. This revision will provide consistent management direction for the Desolation Wilderness across administrative boundaries. The purpose of the Draft Environmental Impact Statement (DEIS) is to disclose to the public and the decision makers the environmental consequences of implementing one of the displayed alternatives.

The Land and Resource Management Plans (LMPs) of both the Eldorado National Forest and the LTBMU direct the Forests to review or develop new management strategies for the Desolation during the current planning period. National policy specifies that LMPs provide standards and guidelines for adequate and consistent wilderness management direction. In addition, use patterns and management strategies have changed over time. After public review of the DEIS, a Final EIS will be issued. The analysis in the Final EIS will lead to a decision to either adopt new management guidelines or continue existing management. A decision to adopt new management guidelines will result in amendments to both the Eldorado and the LTBMU LMPs.

The Wilderness Act of 1964 and Forest Service regulations (CFR 293.2) direct that "National Forest Wilderness resources shall be managed to promote, perpetuate, and, where necessary, restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation." Regulations further state that "natural ecological succession will be allowed to operate freely to the extent feasible", and that "Wilderness will be made available for human use to the optimum extent consistent with the maintenance of primitive conditions".

ISSUES ANALYZED IN THIS DEIS

The issues which are considered in this DEIS address public and management concerns. The public meetings, scoping letters, and specialists' input have identified a range of issues and concerns with regard to conditions in and around Desolation Wilderness and their management. The following issues were used to develop and analyze the six alternatives.

ECOSYSTEM SUSTAINABILITY ISSUES

1. Fire

Fire suppression has affected the development and maintenance of natural plant communities and the resulting ecosystems. Consequently current fire management policy and suppression techniques are not consistent with maintaining natural processes and wilderness characteristics.

2. Range

In grazing allotments, current grazing practices may impact water quality, vegetation (including sensitive species), meadow & riparian areas, wildlife, and archeological sites. Conflicts between grazing and recreationists may occur, especially in high use areas.

3. Water Quality

Current use and management practices may be creating unacceptable water quality conditions in Desolation Wilderness.

RECREATION USE AND ADMINISTRATION

4. Wood Fires

The ban on wood fires within the wilderness was initiated in 1990 to protect the wilderness resource, however, numerous wilderness users value campfires as part of their wilderness experience. The ban is scheduled for review in this planning process and a final determination will be made.

5. Visitor Impacts

Some areas of the wilderness, especially lake shores, riparian zones and easily accessible destinations are being damaged by visitor use.

6. Quotas and Group Size

The number and distribution of overnight and day users and the size of groups (including stock) affects the values and character of Desolation wilderness and also the wilderness experience of users.

Included in this issue is a discussion of the appropriate guidelines for allowing commercial use (outfitters, guides and others) within a heavily used wilderness such as Desolation.

7. Aircraft Over flights

Aircraft over flights, common in Desolation Wilderness, adversely affect the wilderness experience of wilderness users.

8. Dogs

Disturbance by dogs may necessitate their regulation in Desolation Wilderness.

9. Trails

Management and development of trailheads and trails both accessing and within the wilderness (including location, maintenance and signing) may affect the amounts and patterns of wilderness use and also the wilderness experience of visitors.

OPPORTUNITIES

The following opportunity has been identified:

1. The Eldorado and the LTBMU have identified the need to provide consistent standards and guidelines language for Air Quality in the two LMPs. Federal laws mandate the protection of Class I Air Quality standards. Each LMP has language regarding protection of the Class I airshed, however, the language in each plan is somewhat different. This planning process will result in consistent language for Air Quality Standards for the two forest plans.

PROCESS USED TO DEVELOP THE ALTERNATIVES

The Purpose and Need for revision of the Desolation Wilderness Management Guidelines, along with the issues listed above, drive the alternatives considered in this DEIS. The "Limits of Acceptable Change" (LAC) planning framework has been used as the framework in which to develop the alternatives. The Wilderness Act of 1964 provides for legitimate uses of wilderness; the LAC system recognizes that human-caused change will occur, but provides a system for determining what amounts of change are acceptable in various portions of the wilderness. The process is used to set measurable standards for the desired conditions in wilderness.

The LAC process utilizes the concept of Opportunity Classes. Opportunity Classes describe the relative "purity" of different areas of the Wilderness based on current conditions. They also define different levels of resource, social, and management conditions acceptable for each class in the spectrum. The wilderness planning team has defined four Opportunity Classes for the Desolation. Opportunity Class descriptions set the desired future condition for each of the Opportunity Classes. In each alternative these descriptions and their associated indicator standards are applied to zones as shown on the Alternative Maps. Below is a summary of the descriptions for each Opportunity Class.

OPPORTUNITY CLASS I:

This area provides an outstanding opportunity for isolation and solitude free from evidence of human activities. Encounters with other users are very infrequent. The area is characterized by an unmodified natural environment; ecological and natural processes are not measurably affected by the actions of users. Environmental impacts are minimal, restricted to temporary loss of vegetation where camping. These areas typically recover on an annual basis, and are subtle in nature and not apparent to most visitors. Trails will be maintained only for resource protection and protection of the trail investment.

OPPORTUNITY CLASS II:

A high probability exists for experiencing isolation from the sights and sounds of human activities. Encounters with other users are low. The area is characterized by an essentially unmodified natural environment. Ecological and natural processes are minimally affected by the action of users. Environmental impacts are low and restricted to minor losses of vegetation where camping occurs and along most travel routes. Most impacts recover on an annual basis and are apparent to a low number of visitors. Trails will be maintained only for resource protection, protection of the trail investment, and minimal user safety.

OPPORTUNITY CLASS III:

Moderate opportunities for exploring and experiencing isolation from the sights and sounds of human activities are found in this area. The probability of encountering other users is moderately frequent, both along trails and at the campsite. These areas are characterized by an essentially unmodified natural environment where ecological and natural processes are in a few areas moderately affected by the actions of users. Environmental impacts are moderate, with most areas along travel routes and near campsites showing loss of vegetation. Impacts in some areas often persist from year to year and are apparent to a moderate number of visitors. Trails only modify natural conditions to the extent necessary to protect the resource, protect the trail investment, and to provide for moderately safe use by visitors with average physical ability.

OPPORTUNITY CLASS IV:

Opportunities for exploring and experiencing isolation from the sights and sounds of human activities are moderate to low. The probability of encountering other area users is moderate to high. This area is characterized by a predominantly unmodified natural environment. Natural conditions in some areas may be substantially affected by the actions of users. Environmental impacts are relatively high, especially at entry points, along travel routes, and at campsites. Most impacts, such as vegetation loss and soil compaction, persist from year to year and are apparent to most visitors. Trails are typically reconstructed, maintained, and managed to accommodate heavy traffic for the majority of the use season. Trails only modify natural conditions to the extent necessary to protect the resource, protect the trail investment, and to provide for reasonably safe use by a user with average physical ability.

The Opportunity Class descriptions are further refined into measurable standards for social and resource conditions. The table on the following page illustrates standards that apply to each Opportunity Class.

INDICATORS AND STANDARDS

Indicators are selected as the means to measure the desired conditions in each Opportunity Class. The indicator standards are the thresholds for acceptable conditions in each Opportunity Class. They establish a basis for identifying a need for management action for areas where actual conditions are in conflict with desired conditions.

INDICATORS	STANDARDS			
	Opp. Class I	**Opp. Class II**	**Opp. Class III**	**Opp. Class IV**
Trail Encounters/ groups per day	average .5 / max. 2	average 2 / max 4	average 4 / max 8	average 15 / max 20
Occupied campsites within sight or sound of an occupied site.	No other occupied campsites within site or sound.	One other occupied campsite within sight or sound.	Two other occupied campsites within sight or sound.	Three other occupied campsites within sight or sound.
Vegetation Loss - max. sq. ft. of devegetated area per campsite.	0 square feet	100 square feet	300 square feet	900 square feet
Frissell Campsite Condition (see below)	Generally only type A sites, no more than 10% type B sites.	Generally only type A & B sites, no more than 25% type C sites.	Only types A, B, & C sites, type C under 50%, no type D sites.	Type D sites will be no more than 50% of the total sites. No type E sites.
Number of User created trails	User created trails will be monitored. The initial number of user created trails will establish a baseline. Exceeding the baseline will prompt management action.			
The following indicators are set for monitoring grazing activities on grazing allotments.				
Ecological Condition	Desired Condition	Desired Condition	Desired Condition	Desired Condition
Trend	stable/upward	stable/upward	stable/upward	stable/upward
Utilization	Allowable utilization will be based on site specific factors listed in the Region 5 Range Analysis Field Guide.			
Soil Disturbance	Allowable soil disturbance will be based on soil texture factors as described in the Region 5 Range Analysis Field Guide and site specific slope characteristics.			
Lake shore and stream channel conditions -	≤20% of any stream reach or lake shore will be trampled and chiseled.	≤20% of any stream reach or lake shore will be trampled and chiseled.	≤20% of any stream reach or lake shore will be trampled and chiseled.	≤20% of any stream reach or lake shore will be trampled and chiseled.
Utilization of Woody Riparian Species	≤ 20% of current year's willow growth.	≤ 20% of current year's willow growth.	≤20% of current year's willow growth.	≤ 20% of current year's willow growth.

Frissell Campsite Condition Classification System:

A. Ground vegetation is flattened, but not permanently injured. Minimal physical change except possibly a simple rock fire ring.

B. Ground vegetation is worn away around the fireplace of center of activity.

C. Ground vegetation is lost on most of the site, but duff and litter are still present in all but a few areas.

D. Bare mineral soil is widespread. Tree roots exposed on the surface.

E. Soil erosion is obvious.

COMPARISON OF THE ALTERNATIVES

The Opportunity Class descriptions and Indicator standards provide the desired conditions for different portions of the wilderness. The Desolation has been divided into forty-five management zones. The zone boundaries correspond generally to topographic features such as ridge lines and lake basins, and to different levels of use. Each zone has been allocated an Opportunity Class designation. The mix of Opportunity Class designations changes across the range of alternatives. For example, Alternative 1 consists only of Opportunity Classes two through four, while Alternative 6 consists only of Opportunity Classes 1 and 2. These allocations have been made consistent with the overall theme of the alternative. Maps of Opportunity Class allocations for each alternative are in Chapter 2 of this DEIS.

The alternatives also provide a range of management actions to address differing perspectives on issues expressed by the public, other agencies, and various members of the interdisciplinary team.

DIRECTION COMMON TO ALL ACTION ALTERNATIVES

A number of issues identified during the scoping process lacked widespread public interest or controversy. Consistent management direction for these issues is derived from Forest Service policy and local management concerns. The following direction is consistent across all action alternatives.

Administration and Planning - Consider activities on both sides of the wilderness boundary during planning.

Required site-specific surveys and environmental analysis will be completed before the initiation of ground disturbing wilderness projects (building of trails, designated campsites, outhouses, etc.).

Soils - General direction for protection of soils will be implemented. Campsite monitoring will include an assessment of impacts to soils.

Hydrology and Water Quality - Direction is provided for the protection of water quality and riparian areas if dams are breached.

Air Quality - General direction provides for evaluation of and comment on proposed major emission sources which might adversely affect the wilderness. Direction for air quality monitoring and smoke management is included.

Fire Management - Direction for suppression of wildfires is included. Objectives for prescribed fire, the conditions under which prescribed fire may be allowed, and direction for a prescribed fire management action plan are included as directed by Forest Service policy.

Fish - Direction which provides for inventories of lakes within the Desolation is included. Lakes will be inventoried to determine depth (where unknown), presence of amphibians, angler use, and fisheries quality.

Vegetation - Sensitive plant populations will receive protection. Populations will be monitored to document their conditions over time. In areas where the vegetation resource has been damaged, natural recovery will be preferred. General direction is provided for revegetation activities.

Wildlife - All existing sensitive wildlife species will receive full protection at current population levels or better.

Range - General direction provides for administering grazing allotments to minimize conflicts with other resource objectives and to promote a harmonious relationship between livestock grazing activities and the wilderness resource.

Heritage Resources - Direction provides for disposition of the cabin at China Flat through consultation with the California State Office of Historic Preservation and the Advisory Council on Historic Preservation.

Wilderness Quality - Implementation of national policy is provided.

Permit/Quota System - General direction is provided to supplement changes to the quota system as defined in the five action alternatives. Changes will be implemented one year after the record of decision for the revised guidelines is signed.

General Recreation Items - Common direction on handicapped access, campsite location, recreation stock travel techniques, bolting, and peak register administration is provided.

Trails and Trailheads - Direction on the standards for signing and trail maintenance are included.

Outfitter/Guides - Direction carries forward national policy on the administration of outfitter/guide permits within wilderness. The definition of outfitter/guiding is included. The method for allocating use to outfitter/guides in the Desolation is provided.

Information and Education - General direction for development and implementation of an information and education program is provided.

ALTERNATIVE DESCRIPTIONS

Following these descriptions, you will find a table, "Desolation Wilderness - A Comparison of Alternatives", which provides a display of the way in which each Alternative addresses each issue.

Alternative 1

This alternative emphasizes the anthropocentric philosophy of wilderness management by addressing society's demands on wilderness, not its natural condition. It maximizes direct human use opportunities within the Desolation. Although wilderness permits and the overnight quota would be maintained, use would increase in this alternative through a relaxation of the overnight quota and continued increases in day use. There is a mix of three Opportunity Classes, Classes 2, 3, and 4, provided in this alternative.

Highlights of the alternative by issue:

Fire - Prescribed natural (lightning caused) fire would be allowed to occur in late season (Sept. 15) in Opportunity Class 2 only.

Range - Current management would continue. Education would emphasize the historical nature of grazing in the wilderness. Standards would protect riparian areas.

Water Quality - Backcountry toilets would be installed as needed in Opportunity Class 4 areas. Water quality monitoring would be increased.

Wood fires - Campfires would be permitted in established fire rings in all areas of the wilderness.

Visitor Impacts - Camping would occur in all zones: a 100' camping setback would be instituted where possible. There would be no limits on the number of stock per group and no other restrictions on stock use.

Quotas and Group Size - The maximum group size would be 25 persons. The overnight quota would continue between June 15 and Labor Day; however, more campers would be allowed into the wilderness each day. There would be no day use quota. Three equestrian guides, 2 winter guides, 2 day hike guides, and 5 camps would offer commercial services under permit, with a limit on the amount of allocated use allowed.

Aircraft Over flights - No actions would be taken to change the existing 2000' AGL (above ground level) advisory.

Dogs - The current management would be maintained.

Trails - The current trail system would be expanded by adding loop trails in high use areas and hiker routes to the existing system. Major trails would be hardened to sustain heavy use. Unimproved trailheads would be upgraded. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue. Additional trail junctions would be signed.

Alternative 2 (No Action Alternative)

This alternative continues the present management guidelines contained in the Land and Resource Management Plans (LMPs) for both the Eldorado National Forest and the Lake Tahoe Basin Management Unit. The 1978 Desolation Wilderness Management Plan would continue to provide supplementary direction. Management direction varies in some cases between the two forest LMPs. The current direction does not provide for the designation of Opportunity Classes. No indicators of social and resource conditions would be established in this alternative.

Highlights of the alternative by issue:

Fire - All fires would continue to be suppressed. The Lake Tahoe Basin may use "confine, contain and control" strategies to a maximum of 25 acres fire size.

Range - Current allotment management would continue.

Water Quality - Continue current education to encourage camping over 100' from water, to encourage use of cat holes and packing out or burying toilet paper.

Wood fires - The special order prohibiting wood fires would continue.

Visitor Impacts - Camping would occur in all zones, camping within 100' of water would be discouraged. There would be no limits on the size of stock groups. Regulations to prevent the tying of pack stock within 100' of water or in meadows would be considered, as directed in the existing Desolation Wilderness Management Plan.

Quotas and Group Size - The maximum group size would continue at 15 persons. The overnight quota would continue between June 15 and Labor Day. There would be no day use quota. Two equestrian guides and 1 camp would offer services under permit with no limit on days of service offered.

Aircraft Over flights - No recommendations would be made to the FAA to change the existing 2000' AGL advisory.

Dogs - The current management would be maintained.

Trails - The current trails would be maintained to provide a network of selected, well maintained trails. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue. Current signing would be maintained.

Alternative 3

This alternative provides measures which would improve the quality of the visitor's primitive Recreation experience. The emphasis here is on providing social and experiential conditions that can give the user a greater sense of solitude and to reduce conflicts that take away from a primitive recreation experience. The number of day and overnight users is lowered slightly through the quota system. This alternative provides a mix of the four Opportunity Classes.

Highlights of this alternative by issue:

Fire - Prescribed planned and natural fire would be allowed under specified conditions throughout the wilderness, except in areas where fire danger would be a safety risk or where fire would be likely to escape the wilderness.

Range - Conflicts between grazing and recreation use in high use areas would be minimized by not herding cattle into three heavily used lake basins in the Wrights Lake Allotment. Permittees would continue to avoid herding cattle into four other lake basins in the Wrights Lake Allotment. If the Pearl Lake Allotment is filled, permittee would avoid herding into the Lawrence Lake Basin. If the Rockbound

Allotment is filled, permittee would avoid herding into a number of heavily used areas and lake basins, and would implement herding strategies to keep cattle out if they drift into those areas. The use of cowbells would be discontinued in wilderness portions of allotments.

Water Quality - A mandatory setback of 200' from water, trails and campsites would be established for human waste (feces) disposal. Users would pack out or bury toilet paper. Water quality monitoring would increase.

Wood fires - "No Trace" campfires would be permitted in designated areas in Opportunity Classes 1 and 2. No campfires would be permitted in Classes 3 and 4.

Visitor Impacts - Some Opportunity Class 4 areas would be day use areas. Individual campsites would be removed to lower campsite density. The number of stock per party would be limited. Stock setbacks would be 200' from water and 100' from campsites and trails.

Quotas and Group Size - The maximum group size would be 15 persons in Opportunity Classes 3 and 4, and 6 in Classes 1 and 2. The overnight quota would be reduced, but still be above current use levels. The quota dates would be extended. In addition, a day use quota would be implemented in Class 4 and then in other areas as needed. Two equestrian guides, 2 winter guides and 5 camps would offer services under permit, with a limit on the amount of use allowed. An additional 250 service days would be available for individual guided trips (one trip applicants). Allocated use would be set at 100% of recent guided use.

Aircraft Over flights - A 2000' AGL mandatory minimum altitude would be recommended to the FAA.

Dogs - Dogs would be permitted on leashes in all areas of the wilderness.

~~**Recreational Shooting** - Recreational shooting would be prohibited from May 15 through September 30.~~

Trails - Areas adjacent to, but outside wilderness, would be targeted for additional trails to relieve pressure on the wilderness. Loop trails would be built outside of the Desolation, but adjacent to Class 4 areas. The lesser used trails would become more primitive. Signing would occur only at major trail junctions. The Eagle Falls bridge would be removed, if needed, to reduce day use. No new wilderness trail heads will be built. Facilities at existing trail heads may be modified or relocated if needed to protect resources or improve health & safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue.

Alternative 4 - Physical Restoration

Several measures which would emphasize physical restoration are proposed in this alternative. More consideration is given to protecting the biophysical components of the Desolation. More emphasis is given to returning to natural ecosystem conditions through such activities as the use of prescribed fire. This alternative provides a mix of all four Opportunity Classes with more Class 1 and 2 areas than in Alternative 3.

Highlights of this alternative by issue:

Fire - Within limits providing for public safety, prescribed fire would be allowed within the wilderness to restore fire to its natural role in the ecosystem.

Range - Conflicts between grazing and recreation use in high use areas would be reduced by not herding cattle into three heavily used lake basins in the Wrights Lake Allotment during years with low precipitation amounts. Permittees would continue to avoid herding cattle into four other lake basins in the Wrights Lake Allotment and one in the Pearl Lake Allotment if it is filled. The Rockbound Allotment, vacant since 1988, would be closed. Standards to protect riparian conditions would be enacted.

Water Quality - As in Alternative 3, regulations would require sanitation setbacks from water, trails and campsites for human waste disposal. Users would pack out or bury toilet paper.

Wood fires - Wood campfires would continue to be prohibited in all areas of the Desolation.

Visitor Impacts - As in Alternative 3, camping would be prohibited in specified Opportunity Class 4 areas. Individual campsites would be removed based on site location and durability. Campsites in riparian areas would be revegetated as needed. Seven heavily used lakes would have designated campsites. The number of stock per party would be limited. There would be a minimum 200' setback of 200' from water and 100' from trails and campsites for stock.

Quotas and Group Size - The maximum groups size would be 12 persons in Classes 3 and 4, and 6 in Classes 1 and 2. The overnight quota would be lowered, but would still accommodate current use levels on all but the peak days. The quota dates would be extended. A day use quota would be implemented in all areas. Two equestrian guides and 5 camps would offer services under permit, with reductions in the amount of allocated use allowed corresponding to reductions in the quota numbers.

Aircraft Over flights - As in Alternative 3, a 2000' AGL mandatory minimum ceiling would be recommended to the FAA.

Dogs - As in Alternative 3, dogs would be permitted on leashes.

Trails - As in Alternative 3, areas adjacent to, but outside the wilderness would be emphasized for additional trails to relieve pressure on the wilderness. Trails would be re-routed in sensitive areas and stream crossings would be repaired. Signs would be provided at major trail junctions. Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if needed to protect resources or improve health & safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue.

As in Alternative 3, the Eagle Falls bridge would be removed, if needed.

Alternative 5 - Enhanced Ecosystem

Ecosystem recovery is the emphasis of this alternative while still allowing moderate visitor use. Measures are considered that allow for additional return to natural ecosystem conditions through broader management of visitor use and additional considerations for natural fire. This alternative provides a mix of Opportunity Classes 1 through 3.

Highlights of this alternative by issue:

Fire - As in Alternative 4, prescribed fire would be allowed in all areas within the wilderness.

Range - Conflicts between grazing and recreation use in high use areas would be reduced by not herding cattle into three heavily used lake basins in the Wrights Lake Allotment during years with low precipitation amounts. Permittees would continue to avoid herding cattle into four other lake basins in the Wrights Lake Allotment and one in the Pearl Lake Allotment if it is filled. The Rockbound Allotment, vacant since 1988, would be closed. Standards to protect riparian conditions would be enacted.

Water Quality - As in Alternative 3, a mandatory setback would be implemented for the disposal of human waste.

Wood fires - Campfires would be prohibited as in Alternative 4.

Visitor Impacts - As in Alternative 4, camping would be precluded in specified areas. Individual campsites would be removed based on site location and durability. Riparian areas would be revegetated. The number of stock per party would be limited. Stock would be allowed in specific areas, with a minimum 200' setback. Recreational stock users would carry forage for their stock.

Quotas and Group Size - The maximum group size would be 12 persons in Opportunity Class 3 and 6 persons in Classes 1 and 2. The overnight quota would be further lowered. A day use quota would be implemented in all areas. Two equestrian guides and 1 camp would offer commercial services under permit, with reductions in the amount of allocated use allowed corresponding to reductions in the quota numbers.

Aircraft Over flights - As in Alternative 3, a 2000' AGL minimum mandatory ceiling would be recommended to the FAA.

Dogs - As in Alternative 3, dogs would be permitted on leashes.

Trails - Areas adjacent to the Desolation would be targeted for new trails. Trails in Opportunity Classes 1 and 2 would be removed when possible. Trails would be maintained for resource protection only; they would be re-routed in sensitive areas and stream crossings would be repaired. Signs would be provided at major trail junctions. Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trail heads will be built. Facilities at existing trail heads may be modified or relocated if needed to protect resources or improve health & safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue.

As in Alternative 3, the Eagle Falls bridge would be removed, if needed.

Alternative 6 - Maximum Wilderness Preservation

This alternative provides the most biocentric approach to resolution of the issues. It places the most emphasis on preservation of natural systems. Stringent controls are placed on human influences in order to return the Desolation to its most natural conditions. The human benefits derived from wilderness under this alternative are dependent on the naturalness of the wilderness ecosystem. This alternative provides for a combination of the two most pristine Opportunity Classes, Classes 1 and 2.

Highlights of this alternative:

Fire - Natural prescribed fires would be allowed under management in all areas of the Desolation.

Range - Conflicts between grazing and recreation use in high use areas would be reduced by not herding cattle into three heavily used lake basins in the Wrights Lake Allotment during years with low precipitation amounts. Permittees would continue to avoid herding cattle into four other lake basins in the Wrights Lake Allotment and one in the Pearl Lake Allotment if it is filled. The Rockbound Allotment, vacant since 1988, would be closed. Standards to protect riparian conditions would be enacted. If Desired Future Conditions are not being met in the Wilderness portions of an allotment within five years, and the trend is stable to downward, then those portions of the allotment will be rested.

Water Quality - Visitors would be required to pack out human waste and toilet paper.

Wood fires - As in Alternative 4, campfires would be prohibited.

Visitor Impacts - As in Alternative 3, camping would be prohibited in areas specified for day use. Individual campsites would be removed based on site location and durability. Campsites in riparian areas would be revegetated as needed. The number of stock per party would be lowered. Stock use would be for day trips only.

Quotas and Group Size - The maximum group size in all areas of the Desolation would be 6. Group sizes of up to 12 would be possible through a special use permit. The number of overnight users permitted each day would be substantially reduced. A day use quota, lower than in Alternative 5, would be implemented in all areas. Two equestrian guides would offer drop camp services and day rides under permit in Opportunity Class 2.

Aircraft Over flights - A 4000' AGL mandatory minimum ceiling would be recommended to the FAA.

Dogs - Dogs would be prohibited in the Desolation.

Trails - All but the major trails would be removed. The major trails would be maintained in primitive condition. Trails would be re-routed to avoid sensitive areas. Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trail heads will be built. Facilities at existing trail heads may be modified or relocated if needed to protect resources or improve health & safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Plans to move and improve the Twin Lakes Trailhead and analysis for restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead would continue. Signing inside the wilderness would be eliminated.

DECISION TO BE MADE

The responsible officials for this DEIS are the Forest Supervisors of the Eldorado and the LTBMU. The analysis in the DEIS will lead to a decision that either adopts new management guidelines or continues existing management (No Action). The decision to adopt new management guidelines will result in amendments to both the Eldorado and the LTBMU LMPs.

Table S-2 Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)/	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Opportunity Class (OC) Allocations provided in each alternative	50% managed for semi-primitive conditions, 50 % for primitive conditions. OC 1 = 0 acres OC 2 = 31,729 acres OC 3 = 13,980 acres OC 4 = 18,252 acres	OC numbers reflect current conditions. 37% semi-primitive, 63% primitive. OC 1 = 0 acres OC 2 = 40,409 acres OC 3 = 8,485 acres OC 4 = 12,865 acres Area exceeding wild. cond. = 2,202 acres	26% managed for semi-primitive conditions, 74% for primitive. OC 1 = 23,738 acres OC 2 = 23,796 acres OC 3 = 13,150 acres OC 4 = 3,277 acres	20% managed for semi-primitive conditions, 80% for primitive. OC 1 = 38,240 acres OC 2 = 12,941 acres OC 3 = 12,122 acres OC 4 = 657 acres	10% managed for semi-primitive conditions, 90% for primitive. OC 1 = 41,464 acres OC 2 = 16,087 acres OC 3 = 6,410 acres OC 4 = 0 acres	100 % managed for primitive conditions (87% managed for pristine conditions) OC 1 = 55,722 acres OC 2 = 8,239 acres OC 3 = 0 acres OC 4 = 0 acres
1. Fire	Prescribed natural fire allowed in late season (Sept. 15) in OC 2 only.	Suppress all fires (LMPs contain differing direction), LTBMU only may confine fires at 25 acres in alpine areas.	Prescribed planned and natural fire allowed throughout wilderness except where expected fire intensity and rate-of-spread offer an unacceptable threat to visitor safety in high use areas or where fire behavior predictions indicate wildfire will escape the wilderness.	Planned and natural ignition prescribed fire in all areas with designated maximum fire size.	Planned and natural ignition prescribed fire in all areas with designated maximum fire size.	Natural ignition prescribed fire in all areas.
(Note: all unplanned human caused fires will be treated as wildfires. Confine and contain wildfire suppression strategies will be used, except where fire behavior predictions indicate that wildfire will escape from the wilderness or pose an unacceptable threat to visitors. Mist techniques will be used when suppressing fires.)						

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
2. Range - ELD only, the LTB portion of the Desolation has no range allotments. **(Cattle numbers will be managed through the AMP process to carry out LMP direction)**	Educate recreationists on range history of the Desolation. Indicator standards for riparian and range conditions will apply. Grazing permits will be adjusted as needed to meet the standards.	Continue current management.	Indicator standards for riparian and range conditions will apply. Grazing permits will be adjusted as needed to meet the standards. Cattle will not be herded into specific lake Basins in the Wrights Lake Allotment. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin. If the Rockbound Allotment is filled, cattle will not be herded into specific high use areas and lake basins, and if they drift there, herding strategies will be implemented to keep them out. The use of cowbells will be discontinued in wilderness portions of allotments.	Indicator standards for riparian and range conditions will apply. Grazing permits will be adjusted as needed to meet the standards. Cattle in the Wrights Lake Allotment will not be herded into specific lake basins during years with low precipitation. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin. The vacant Rockbound Allotment will be closed.	Indicator standards for riparian and range conditions will apply. Grazing permits will be adjusted as needed to meet the standards. Cattle in the Wrights Lake Allotment will not be herded into specific lake basins during years with low precipitation. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin. The vacant Rockbound Allotment will be closed.	Indicator standards for riparian and range conditions will apply. Grazing permits will be adjusted as needed to meet the standards. If DFC's are not met within wilderness portions of allotments within 5 years & trend is stable or downward, then those portions of the allotments will be rested. Cattle in the Wrights Lake Allotment will not be herded into specific lake basins during years with low precipitation. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin. The vacant Rockbound Allotment will be closed.

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
3. Water Quality	Install Backcountry toilets in heavy use areas (OC 4); initiate additional monitoring.	Continue current recommendation for 100' setback for human waste (feces) disposal, use of cat holes, burying or carrying out TP. Continue current monitoring.	Mandatory 200' setback from water, trails and campsites for human waste disposal. Recommendation to use cat holes. Required to pack out or bury TP. Increased monitoring.	Mandatory 200' setback from water, trails and campsites for human waste disposal. Recommendation to use cat holes. Required to pack out or bury TP. Increased monitoring.	Mandatory 200' setback from water, trails and campsites for human waste disposal. Recommendation to use cat holes. Required to pack out or bury TP. Increased monitoring.	Pack out all human waste in all areas of the Desolation.
4. Wood fires	Wood fires permitted in established fire rings only.	Wood fires prohibited. Fully enclosed stoves permitted.	"No Trace" campfires permitted in designated areas in OC 1 & 2. No campfires in OC 3 & 4.	Wood fires prohibited. Fully enclosed stoves permitted.	Wood fires prohibited. Fully enclosed stoves permitted.	Wood fires prohibited. Fully enclosed stoves permitted.
5. Visitor Impacts **a. Camping restrictions and rehabilitation.**	Camping in all zones. Where possible, 100' camping setbacks from water will be initiated. Campsites near water will be hardened.	Camping in all zones. There will be no camping setbacks.	No camping in high use OC 4 areas. No camping setbacks, individual campsites will be removed based on social and biophysical factors. Campsites eliminated in riparian areas will be revegetated as needed. There will be designated campsites at some lakes.	No camping in high use OC 4 areas. No camping setbacks, individual campsites will be removed based on social and biophysical factors. Campsites eliminated in riparian areas will be revegetated as needed. More campsites will be removed than in Alternative 3.	No camping in high use areas. No camping setbacks, individual campsites will be removed based on social and biophysical factors. Campsites eliminated in riparian areas will be revegetated as needed. More campsites will be removed than in Alternative 4.	No camping in high use areas. No camping setbacks, individual campsites will be removed based on social and biophysical factors. Campsites eliminated in riparian areas will be revegetated as needed. More campsites will be removed than in Alternative 5.

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
b. Recreation stock restrictions	No limits on the number of stock per group.	No limits on the number of stock per group.	2 stock per person with a limit of 15 total per party in OC 3 & 4, limit of 10 total per party in OC 1 & 2. Setback of 200' from water & 100' from campsites & trails.	2 stock per person with a limit of 12 total per party in OC 3 & 4, limit of 8 total per party in OC 1 & 2. Setback of 200'from water & 100' from campsites & trails. Stock will be excluded from some areas.	2 stock per person with a limit of 10 total per party in OC 3, limit of 6 total per party in OC 1 & 2. Setback of 200'from water & 100' from campsites & trails. Recreation stock will be allowed in specific areas only. Stock users shall carry supplemental feed for rec. stock.	2 stock per person with a limit of 6 total per party. Setback of 200'from water & 100' from campsites & trails. Stock use would be only for day trips.
6. Quotas and Group Size **a. Group size**	25 persons/group	15 persons/group	15 persons/group in OC 3 & 4, 6 persons /group in OC 1 & 2	12 persons/group in OC 3 & 4, 6 persons /group in OC 1 & 2	12 persons/group in OC 3, 6 persons /group in OC 1 & 2	6 persons/group in OC 1 & 2; larger groups up to 12 possible through a special use permit.
b. Quota dates	6/15 through Labor Day	6/15 through Labor Day	5/1 through 9/30	5/1 through 9/30	5/1 through 9/30	4/1 through 10/31

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
c. Overnight Quota	Preliminary quota of 793 persons per day set to meet OC standards. Numbers may change if standards are exceeded. Quota will be administered by trailhead.	Current quota of 700 persons per day will continue. The quota is administered by trailhead.	Preliminary quota of 582 persons per day set to meet OC standards. Numbers may change if standards are exceeded. Admin. by destination for OC 3 & 4, by zone for OC 1 & 2.	Preliminary quota of 495 persons per day set to meet OC standards. Numbers may change if standards are exceeded. Admin. by destination for OC 3 & 4, by zone for OC 1 & 2.	Preliminary quota of 402 persons per day set to meet OC standards. Numbers may change if standards are exceeded. Admin. by destination for OC 3, by zone for OC 1 & 2.	Preliminary quota of 264 persons per day set to meet OC standards. Numbers may change if standards are exceeded. Admin. by zone.
d. Day Use Quota	No day use quota.	No day use quota.	A day use quota will be implemented at trailheads into high use OC 4 areas; quotas will be implemented at other trailheads as indicator standards are exceeded in those areas. Quotas will be administered by trailhead.	Preliminary quota of 211 PERMITS per day set to meet OC standards. Numbers may change if standards are exceeded. Quotas will be administered by trailhead.	Preliminary quota of 165 PERMITS per day set to meet OC standards. Numbers may change if standards are exceeded. Quotas will be administered by trailhead.	Preliminary quota of 104 PERMITS per day set to meet OC standards. Numbers may change if standards are exceeded. Quotas will be administered by trailhead.
e. Reservation/permit fee	Pursue a reservation and/or permit fee.	Pursue a reservation and/or permit fee.	Pursue a reservation and/or permit fee.	Pursue a reservation and/or permit fee.	Pursue a reservation and/or permit fee.	Pursue a reservation and/or permit fee.

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
f. Commercial Outfitter Guides (O/Gs)	3 equestrian O/Gs, 2 winter O/Gs, 5 camps, and 2 day hike O/Gs will be permitted to operate in the Desolation. Allocated use will be allowed at 100% of recent average use of service days.	2 equestrian O/Gs and 1 camp are permitted to operate in the Desolation. There is no limit on the number of service days permitted.	2 equestrian O/Gs, 2 winter O/Gs, and 5 camps will be permitted to operate. In addition, 250 service days will be available for "one trip applicants". Allocated use will be 100% of recent service day use in OC 3 & 4, 80 % in OC 1 & 2.	2 equestrian O/Gs and 5 camps will be permitted to operate. Allocated service days in all OCs will be proportionate to changes in the overall quota and use will be regulated by zone.	2 equestrian O/Gs and 1 camp will be permitted to operate. Allocated service days in all OCs will be proportionate to changes in the overall quota and use will be regulated by zone. Wilderness education requirements for O/Gs.	2 equestrian (for drop camps and day rides only). Guided use will occur in OC 2 zones only.
7. Aircraft Overflights	No recommendation to FAA to change existing 2,000' AGL (above ground level) flight advisory.	No recommendation to FAA to change existing 2,000' AGL (above ground level) flight advisory.	Recommendation to FAA for 2,000 AGL mandatory minimum altitude over Desolation.	Recommendation to FAA for 2,000 AGL mandatory minimum altitude over Desolation.	Recommendation to FAA for 2,000 AGL mandatory minimum altitude over Desolation.	Recommendation to FAA for 4,000 AGL mandatory minimum altitude.
8. Dogs	Continue recommendation that dogs be under voice control.	Continue recommendation that dogs be under voice control.	Require that dogs be on a leash in compliance with El Dorado County ordinance.	Require that dogs be on a leash in compliance with El Dorado County ordinance.	Require that dogs be on a leash in compliance with El Dorado County ordinance.	Dogs will be prohibited.

Desolation Wilderness - Comparison of Alternatives

ISSUE	Alternative 1	Alternative 2 (No Action)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
9. Trails						
a. Trail Construction and maintenance	Expand the trail system, maintain all trails at standard levels, harden trails near water, construction of loop trails in OC 4 zones.	No new trail construction, continue current maintenance & reconstruction using FS Handbook standards.	No new trail construction. Emphasize areas outside of wilderness for trails. Re-route trails in sensitive areas. Remove specific trails on a case-by-case basis.	No new trail construction. Emphasize areas outside of wilderness for trails. Re-route trails in sensitive areas. Remove specific trails on a case-by-case basis. The Eagle Falls bridge will be removed, if needed.	No new trail construction. Emphasize areas outside of wilderness for trails. Re-route trails in sensitive areas. Remove trails in Class 1 & 2 areas when possible. Maintain trails for resource protection only. The Eagle Falls bridge will be removed, if needed.	The PCT will be maintained to national standards. No new trails. Remove all but major trails. Maintain major trails in primitive condition. Re-route trails in sensitive areas. The Eagle Falls bridge will be removed.

b. Trailheads	Unimproved trailheads will be upgraded. Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.	Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.	No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if capacity is not increased. Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.	Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if capacity is not increased. Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.	Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if capacity is not increased. Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.	Trailhead capacities would be adjusted to match trailhead quotas. No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if capacity is not increased. Continue plans to move & improve the Twin Lakes trailhead and analysis for restrooms and relocation/adjustment to capacity of parking at Twin Bridges Trailhead.
c. Signing	Additional trail intersections will be signed.	Continue current directional signing at trail intersections.	Directional signing only at designated major trail intersections.	Directional signing only at designated major trail intersections.	Directional signing only at designated major trail intersections.	Remove all signing inside the wilderness.

INTRODUCTION

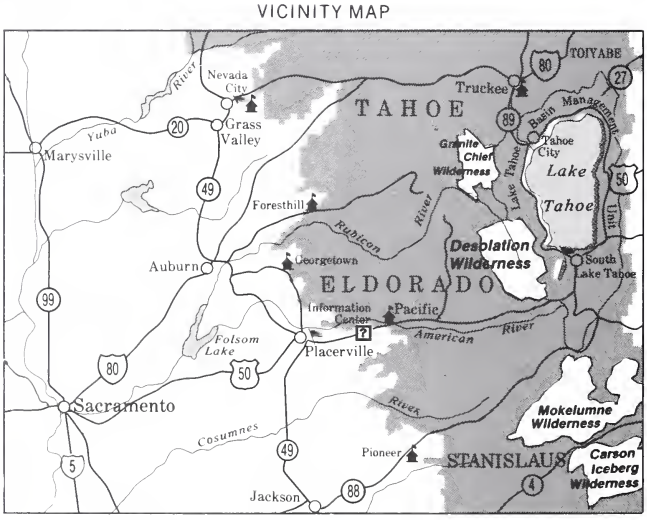
INTRODUCTION

The Eldorado National Forest and the Lake Tahoe Basin Management Unit have identified a need to review the management direction for Desolation Wilderness. The impetus for this review derives from several sources.

The Eldorado National Forest Land and Resource Management Plan (LRMP) and the Lake Tahoe Basin Management Unit (LTBMU) LRMP, both completed in 1988, contain direction to review or develop new management strategies for the Desolation during this planning period. The existing Desolation Wilderness Management Plan was written in 1978, superseding a prior plan from 1973. The driving purpose of the 1978 plan was to correct ecosystem impacts and overcrowding (the Wilderness Act of 1964 specifies solitude as a principal value of wilderness recreation) occurring in heavily used areas of the wilderness. One primary outcome was the establishment of trailhead quotas on overnight users as a tool to reduce both impacts and crowding. Since 1978, visitor use patterns within the wilderness have changed. Day use has increased substantially. This change has occurred due to increased population numbers in urban areas and improved access to wilderness trailheads. During the same period, the methodologies for the management of wilderness areas have grown more sophisticated.

The forests are also responding to national direction that LRMPs provide standards and guidelines for adequate and consistent wilderness management direction. The Eldorado and LTBMU LRMPs each contain guidelines for managing the wilderness. These guidelines are often general and do not provide direction specific to wilderness. They are, at times, inconsistent between the two Forests. Based on the direction provided in the 1964 Wilderness Act, forest direction should assure that protection of the wilderness resource will be the driving force for management activities over time. Present use and the resulting impacts have created conditions within the Desolation which are not consistent with direction contained in the 1964 Wilderness Act.

This Draft Environmental Impact Statement (DEIS) was prepared to provide the basis for adoption of revised wilderness management guidelines for the Desolation Wilderness. The purpose of an EIS is to inform the responsible official of the environmental consequences of implementing various management alternatives, thereby facilitating informed decision making. Additionally, this document is presented in draft form for review and comment by the public, scientists, and other government agencies. After full consideration of these comments, a final EIS will be prepared and issued.



Location Map

Chapter 1

PURPOSE AND NEED

CHAPTER I - PURPOSE AND NEED

A. PROPOSED ACTION

The USDA Forest Service proposes to amend the Eldorado National Forest and the Lake Tahoe Basin Management Unit LRMPs to provide revised management guidelines for the Desolation Wilderness.

B. PURPOSE AND NEED

The purpose of the proposed action is to develop and implement consistent standards and guidelines for adequate wilderness management between the two Forests using the Limits of Acceptable Change (LAC) process.

This DEIS will provide the basis for revising the management direction and standards and guidelines for the Desolation Wilderness in a manner which will: 1) provide for the long-term preservation of the area's wilderness character under a principle of non-degradation; 2) allow the use and enjoyment of the area by visitors in a manner which ensures the protection of the area over time; 3) manage the area using the minimum tool necessary to accomplish the job; and 4) provide unified management of the area across administrative boundaries. The revised direction will include descriptions and an allocation of Opportunity Classes within the Wilderness.

This DEIS is prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) Regulations 40 CFR 1500-1508; Forest Service Manual 1950 - Environmental Policies and Procedures; and Forest Service Handbook 1909.15 - Environmental Policies and Procedures Handbook.

C. NATIONAL WILDERNESS MANAGEMENT DIRECTION

Wilderness management strategies have evolved significantly since 1978 when the Desolation Management Plan was written. The Forest Service has emphasized a two-stage decision-making approach (programmatic vs. project level decisions) which places management direction for wilderness in the forest LRMPs. Current Forest Service policy (FSM 2322.03.4) directs that "management direction shall be consistent for each wilderness that occurs...in more than one National Forest." The LTBMU completed its LRMP in 1988, the Eldorado in 1989. The Eldorado LRMP directs the forest to review or develop new management strategies or controls for this and the next planning period. The LTBMU LRMP directs that a complete review of the wilderness plan be scheduled with the Eldorado National Forest with the objective of evaluating progress on achieving current direction and preparing a revised plan for the area. The wilderness standards and guidelines in the existing two LRMPs have been evaluated. They are often general and, at times, provide different management direction for Desolation Wilderness.

Primary direction for the revision of the Desolation Wilderness Management Plan is provided by the National Forest Management Act of 1976 (NFMA), as further clarified by federal regulations codified at 36 CFR 219.18. Specifically, national direction dictates that LRMPs contain standards and guidelines which provide adequate wilderness management direction. If the management direction in the forest plans is found to be inadequate, the LRMPs will be amended.

The 1964 Wilderness Act and USDA regulations stipulate two principle goals in managing wilderness: 1) to maintain the integrity of the wilderness resource and 2) to provide an outstanding opportunity for solitude or a primitive quality of recreation experience.

Additional direction is provided by the 1964 Wilderness Act; the National Environmental Policy Act (NEPA) of 1969; Council on Environmental Quality (CEQ) Regulations codified at 40 CFR 1500 through 1508; and the Forest Service Wilderness and Primitive Area regulations codified at 36 CFR 293. The Forest Service Manual (FSM) 2320--Wilderness Management; FSM 2610 -- Wildlife Management; Forest Service Handbook (FSH) 1909.15--Environmental Policies and Procedures; FSH 2308.18--Trails Management; FSH 2309.19--Wilderness Management; and FSH 7109.11--Signs; all provide detailed direction. The Clean Air Act of 1977 directs the Forest Service to protect Class I air quality standards in Desolation. CFR 296 provides protection for archeological resources on all Federal lands.

Selected excerpts from these laws and regulations follow.

The Wilderness Act of 1964 defines wilderness as an area:

> "...where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation...."
>
> "...protected and managed so as to preserve its natural conditions and which...has outstanding opportunities for solitude or a primitive and unconfined type of recreation...."
>
> "... administered for the use and enjoyment of the American people in such a manner as will leave [the area] unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character...."

The U.S. Department of Agriculture (USDA) regulations specify that in carrying out the purposes laid down in the 1964 Wilderness Act the:

> "...National Forest Wilderness resources shall be managed to promote, perpetuate, and, where necessary, restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation. To that end: (a) Natural ecological succession will be allowed to operate freely to the extent feasible; (b) Wilderness will be made available for human use to the optimum extent consistent with the maintenance of primitive conditions; (c) In resolving conflicts in resource use, wilderness values will be dominant to the extent not limited by the Wilderness Act, subsequent establishing legislation, or the regulations in this part." (36 CFR 293.2)

USDA Regulations at 36 CFR 219.18 state:

> "Forest planning shall provide direction for the management of designated wilderness...."
>
> "...provide for limiting and distributing visitor use of specific areas in accord with periodic estimates of the maximum levels of use that allow natural processes to operate freely and that do not impair the values for which wilderness areas were created."

FSM 2320.6 directs wilderness managers to:

> "Manage the wilderness resource to ensure its character and values are dominant and enduring. Its management must be consistent over time and between areas to ensure its present and future availability and enjoyment as wilderness. Manage wilderness to ensure that human influence does not impede the free play of natural forces or interfere with natural successions in the ecosystems and to ensure that each wilderness offers outstanding opportunities for solitude or a primitive and unconfined type of recreation. Manage wilderness as one resource rather than a series of separate resources."

D. RELATIONSHIP TO OTHER PLANS

This document has been prepared under the "two-step planning process", as required by Forest Service regulations. The basic framework is that broad management direction is provided by the Land and Resource Management Plans (LRMPs); adequate guidelines for managing wilderness are to be included in each LRMP. Site-specific project decisions are to be made using additional NEPA analysis and documentation, tiering to the higher-level direction contained in the LRMPs.

The Desolation Wilderness Management Guidelines will provide overall direction for the management of this wilderness. These guidelines will supersede the existing wilderness plan--incorporating existing direction where appropriate--and will be incorporated into the Eldorado and LTBMU LRMPs, through the LRMP amendment process. Subsequent site-specific projects will be conducted under the umbrella of these management guidelines.

E. MANAGEMENT GOALS AND OBJECTIVES

The goals of this DEIS have been developed from direction provided by the 1964 Wilderness Act, the Eldorado N.F. LRMP and the LTBMU LRMP, and other laws and USDA regulations. The general goals of these guidelines are:

1. Wilderness Management Goals

a. To provide for the long term protection and preservation of the area's wilderness character under a principle of nondegradation. Ecosystems will be unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces. The area's natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they will remain unimpaired.

b. To manage the wilderness area for the use and enjoyment of visitors in a manner that will leave the area unimpaired for future use and enjoyment as wilderness.

c. The wilderness resource will be dominant in all management decisions where a choice must be made between preservation of wilderness character and visitor use. Other resources in wilderness will be managed in a manner compatible with wilderness resource management objectives. Where necessary, restore those values dependent on a wilderness setting.

d. To manage the area using the minimum tool, equipment, or structure necessary to successfully and safely accomplish the objective. The chosen tool, equipment, or structure should be the one that least degrades wilderness values temporarily or permanently. Economy, convenience, commercial value, and comfort are not standards of management or use. Direct controls and restrictions will be applied only as essential for the protection of the wilderness resource.

e. To manage nonconforming uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the area's wilderness character. Nonconforming uses are the exception rather than the rule; therefore, emphasis is placed on maintaining wilderness character.

f. To manage the wilderness as a total unit and to coordinate management direction across administrative boundaries. Interdisciplinary skills will be used in planning for wilderness use and administration. Because wilderness does not exist in a vacuum, activities on both sides of the wilderness boundary will be considered during planning.

2. Specific Wilderness Resource Management Goals

The general goals for wilderness management are further refined into goals specific to the various resource elements present in the Desolation. These resource specific goals provide direction for wilderness standards and guidelines which will be written for each Forest LRMP amendment at the conclusion of the NEPA process.

Physical/Biological Elements

Soils

To limit soil displacement and erosion resulting from human activity and authorized uses to a rate similar to that which occurs naturally.

To prevent soil compaction resulting from human activity and authorized uses from progressing to a point where natural plant establishment is precluded (trailheads, trail treads, and desired traditionally used camp areas excepted).

Hydrology and Water Quality

To maintain the riparian habitats of streams, springs, ponds and wetlands in their natural state.

To manage human activity and authorized uses so that the integrity of surface water resources is maintained.

Air Quality

To prevent significant adverse effects of air pollutants and atmospheric deposition on wilderness resources, including visibility.

To cooperate with local, state and federal air regulatory agencies to protect wilderness resources from adverse air pollution effects.

Fire, Forest Diseases and Insect Activity

To allow lightening caused fire, indigenous insects, forest diseases and plants to play, as nearly as possible, their natural ecological role in the wilderness ecosystem.

Vegetation

To limit the interruption of natural plant succession processes resulting from human activity and authorized uses to a rate which is consistent with the Opportunity Class Description for each area.

To prevent the loss of trees and excessive loss of ground cover at traditionally used camp areas and other heavily used locations.

Fish and Wildlife

To provide an environment where the forces of natural selection and survival rather than human actions determine distribution, number and interactions of indigenous wildlife species.

To limit habitat alteration resulting from human activity and authorized uses to a rate commensurate with the resource descriptors for each Opportunity Class.

To provide protection for known populations and aid recovery in areas of previous habitation, of federally listed threatened or endangered species and their habitats, so long as the action is for correcting an undesirable condition resulting from human activity or authorized uses.

Range

To manage wilderness range in a manner that utilizes the forage resource in accordance with established wilderness objectives.

Heritage Resources

To identify, preserve, and protect significant cultural resource sites pursuant to Federal laws and in a manner consistent with protection of the wilderness resource.

Recreation Elements

Recreation Use

To provide outstanding opportunities for visitors to experience solitude and to participate in primitive and unconfined types of recreation activities that are consistent with preservation of wilderness character and that depend upon a wilderness setting.

Managerial Elements

Signs

To limit provision of regulatory and informational signs to trailheads and locations where their placement is absolutely necessary to protect specific resource values.

Trails

To minimize the establishment of impromptu footpaths created by excessive use of certain cross-country routes.

To maintain a designated system of trails as needed to protect resources.

Trailheads

To provide adequate portal facilities for planned levels and types of users consistent with wilderness objectives.

Camping Areas

To maintain physical separation between camping areas appropriate for the social objectives for each area.

Use Authorizations

To authorize only those activities and use which are wilderness dependent and are not expected to diminish the wilderness character of the area or the experience expectations of visitors.

To permit visitation and use for purposes other than recreation, including monitoring, research and scientific study, so long as planned activities are compatible with other wilderness management objectives and leave the area unimpaired for future use and enjoyment as wilderness.

Emergency Services

To provide emergency visitor assistance, including the administration of first aid and initiation of search and rescue operations, whenever visitor safety or life-threatening situations warrant remedial action.

Information and Education

To increase awareness and understanding of wilderness values, wilderness management principles, and management situations and issues specific to the Desolation Wilderness.

To make information about the wilderness available to the public on request, but without advertising or promoting use of the Desolation.

To encourage visitor compliance with established use regulations and recommended ethics through the provision of positively worded information about the unique resource and "Leave No Trace" visitation ethics.

To divert use not dependent on wilderness to alternative areas.

F. PUBLIC INVOLVEMENT

The Forest Service Manual 1950.2 and the Forest Service Handbook 1909.15 prescribe a series of planning steps to be followed to comply with NEPA requirements. They were followed in the development of this DEIS. The first of these steps is the scoping process. Through scoping, planners refine the proposed action (in this case, development of revised management guidelines for the Desolation Wilderness), identify public issues and management concerns, and establish an interdisciplinary (ID) team. Through this process, public input is solicited.

Public involvement for the preparation of this DEIS officially began on May 13, 1992, with the publication of the Notice of Intent in the Federal Register (see Appendix). News releases were issued to the media on May 15, 1992.

Four public scoping meetings were conducted in 1993. They were held in Placerville on June 17th, South Lake Tahoe on June 18th, Sacramento on June 23rd, and Oakland on June 25th. The main objectives of these meetings were to describe the NEPA and Limits of Acceptable Change (LAC) processes, answer questions, and obtain public suggestions for issues and concerns to be addressed. Attendance at these meetings was sparse; a total of 41 persons attended these meetings.

In addition to the public scoping meetings, approximately 400 individuals, agencies and organizations were mailed a "scoping letter", informing them of the proposal and soliciting their concerns. The response period ended on July 10, 1992, and resulted in 49 written public responses. After the closing date of the scoping period, all of the public responses received were read and a list was developed of topics that covered the range of issues addressed. These topics were organized into categories. Finally comments were collated into topics and categories to avoid duplication and to describe the diversity of opinions expressed. This content analysis summary is part of the planning files.

Two open houses were held in May 1994 (Placerville and South Lake Tahoe) to inform the public of draft management alternatives being considered for the Desolation. Public responses from these meetings are part of the planning file.

Public records of the planning process are available for review at the Eldorado National Forest, 100 Forni Road, Placerville, CA 95667.

G. ISSUES NOT ANALYZED IN THIS DEIS

Issues Outside the Scope of this DEIS or already mandated by law:

The following issues will not be analyzed in this DEIS either because they are already mandated by law or they are outside the scope of this analysis:

Motorized and mechanized use:

The Wilderness Act of 1964 contains specific direction allowing motorized and mechanized use only within a narrow range of possibilities. This precludes the use of motorized and mechanized equipment by the public and places restrictions on administrative use of motorized and mechanized equipment for fire suppression and search and rescue activities.

Buffer zones:

Amendment 2300-90-2 to FSM 2320.3 prohibits the establishment of buffer zones either inside or outside of the designated wilderness.

Additional wilderness designation:

The designation of additional wilderness areas is reserved for Congress (PL 88-577 Sec. 3[b]).

Elimination of grazing:

Congress has directed that "there shall be no curtailment of grazing permits or privileges in an area simply because it is designated as wilderness" (sec. 108, P.L. 96-560, H.R. Report 96-617).

Removal of dams:

The presence and maintenance of the FERC-licensed dams (Lake Aloha and Rubicon Reservoir) are specifically allowed by the enabling legislation for Desolation Wilderness. The dams are to be managed in a manner consistent with the management of the surrounding wilderness. (PL 91-82). Stream flow maintenance dams are discussed under Fisheries/Aquatic Resources below.

Hunting and Recreational Shooting:

The Wilderness Act, Sec. 4 (8) states "Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests." This has provided for State jurisdiction over hunting and fishing as legitimate uses in wilderness.

Many wilderness visitors are disturbed by the recreational use of firearms in Desolation Wilderness. (Recreational Shooting is the discharge of firearms for purposes other than the taking of animals under California Department of Fish and Game regulations.) Studies by Watson and Daigle (1991) indicate that 80% of Desolation's visitors would like to see restrictions on recreational shooting. In high use areas of the Desolation, visitor safety may be jeopardized by recreational shooting. Due to the difficulty, however, in distinguishing for enforcement purposes the discharge of firearms for hunting as opposed to recreational shooting, these two issues will not be addressed separately in this document. Public safety with regards to shooting of all types is discussed in Chapter 2, Management considerations Common to All Alternatives.

Nothing proposed in this plan affects the ability of a person to carry firearms.

Fisheries/Aquatic Resources:

Many lakes in Desolation Wilderness were naturally fishless; stocking of most of these lakes began before wilderness designation. Stocking is necessary to maintain fish populations in a number of Desolation's lakes. There is an increasing body of research which indicates that populations of non-native fish may impact the natural aquatic systems, including native amphibian and invertebrate populations. Recreational users often expect to catch fish in wilderness lakes. However, others see fishing as an artificial attraction, not dependent on or appropriate in a wilderness setting. Concerns also exist over the use of aircraft to stock fish and the presence of small stream flow maintenance dams in the wilderness.

The management of fish and wildlife within the Desolation is guided by two agreements. The first agreement, "Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau of Land Management Wilderness" (FSH 2309.19), was developed by the International Association of Fish and Wildlife Agencies (IAFWA), an association which includes state fish and wildlife agencies, in cooperation with the Forest Service and the Bureau of Land Management. The second agreement is a Memorandum of Understanding (MOU) between the California Department of Fish and Game and Region 5 of the Forest Service. The MOU was recently updated to be consistent with the IAFWA agreement (USDA FSM R-5 Supplement 2610-96-1)

The IAFWA agreement provides general direction that fish and wildlife management activities will emphasize the protection of natural processes. Specific direction for fish stocking states that "fish stocking may be conducted by the State agency in coordination with the administering agency, using means appropriate for wilderness, when either of the following conditions is met: (a) to reestablish or maintain an indigenous species adversely affected by human influence; or (b) to perpetuate or recover a threatened or endangered species. ...Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species is likely to survive." The selection of lakes and species to be stocked are to be determined jointly by the State and Federal agencies and spelled out in individual Forest LRMPs. In addition, decisions to remove stream flow maintenance dams will be made jointly by the two agencies. (FSH 2309.19, 23.1).

Because fisheries management decisions, including fish stocking and stream flow maintenance dam management decisions, are to be made jointly between the Forest Service and the California Department of Fish and Game, this issue is outside the scope of this DEIS. The Eldorado N.F., and the Lake Tahoe Basin Management Unit are cooperating with the California Department of Fish and Game, Region 2, in determining the lakes and species to be stocked within the Desolation. An agreement has been developed during a series of meetings between the two agencies and is currently being reviewed by both agencies. The agreement will be available to the public upon signing. Fisheries management and the management of stream flow maintenance dams are not part of the decision to be made in this DEIS.

Management of activities adjacent to, but outside of the Desolation:

Activities, such as commercial use, logging, management of off-highway vehicle (OHV) and other transportation routes, and management of developed recreation areas, which occur outside the wilderness boundary, but in close proximity to wilderness are best addressed elsewhere in the Forest planning process, such as environmental analyses for recreation facilities and timber sales. Forest Service policy directs that buffer strips will not be maintained outside the wilderness boundary to provide an informal extension of wilderness, nor will internal buffer zones which degrade wilderness values be maintained.

Issues Lacking Widespread Public Interest or Resource Impacts

The CEQ regulations strongly emphasize that "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail." With this in mind, some issues, such as the number of flights allowed to FERC licensed facilities and management of litter were dropped from detailed study due to their lack of widespread public concern. These issues will not be individually analyzed, but will be incorporated into the management guidelines. Other issues, such as signing, commercial use, lake shore damage, and sanitation, are dealt with as part of a larger issue. Some issues, such as wilderness education and wilderness staffing levels are treated uniformly throughout the alternatives.

H. ISSUES ANALYZED IN THIS DEIS

Many of the issues raised in the scoping process were found to warrant consideration because they are: 1) within the Forest Supervisor's authority to address and within the scope of this DEIS and 2) significant in terms of public interest and/or potential effects. While some specific issues received more comments than others, all topics of public concern are analyzed. These issues are described below. The issues are separated into two categories, ecosystem sustainability and recreation administration, based on the primary emphasis of the issue.

ECOSYSTEM SUSTAINABILITY ISSUES

1. Fire

Fire suppression has affected the development and maintenance of natural plant communities and the resulting ecosystems. Consequently current fire management policy and suppression techniques are not consistent with maintaining natural processes and wilderness characteristics.

The historical and current fire suppression practices of suppressing every fire have resulted in high fuel loading, changes in the vegetational composition and alteration of wildlife habitat. There is a desire to reintroduce fire, a natural process, back into the wilderness. Risk of a catastrophic fire has increased in wooded areas. Desolation is a heavily used wilderness with housing developments proximate to the southern and eastern boundaries. The Wilderness itself is a Class I airshed. There are air quality concerns related to smoke management in Desolation Wilderness and in the Lake Tahoe Basin. For fires which are suppressed, there are concerns regarding the use of motorized equipment such as helicopters, fire suppression techniques and rehabilitation activities.

The current practice on the Eldorado NF and the LTBMU is to suppress all fires in Desolation Wilderness. If fire is to be allowed to more nearly play its natural role, appropriate and consistent management direction must be drafted and a Fire Management Plan must be approved.

2. Range

In grazing allotments, grazing practices may impact water quality, vegetation (including sensitive species), meadow and riparian areas, wildlife, archeological sites and the primitive recreation experience of some visitors.

The grazing of livestock is a use which predates wilderness designation for the Desolation. In such cases the practice is specifically allowed under the 1964 Wilderness Act. However, there is a concern that grazing is having adverse impacts on water quality, plant species composition including sensitive species, riparian areas, wildlife and archeological sites.

Many visitors are disturbed by the presence of cattle and feel that the noise and droppings associated with them adversely affects their primitive recreation experience. Cattle within Desolation allotments often congregate in lake basins where forage and water are present. Such basins are also typically popular destinations for recreation use. Specific basins where known conflicts between recreation use and grazing occur include Maude Lake, Grouse Lake, Gertrude Lake, Lake Sylvia, and Lyons Lake. If grazing were reintroduced in the vacant Pearl Lake allotment, conflicts between recreation use and grazing would be likely to occur in the Lawrence Lake basin. The Rockbound Allotment, also vacant, currently provides a Remote Pristine experience. There is concern that reintroducing grazing in the Rockbound allotment would change that experience. If the Rockbound allotment were filled, conflicts between recreation use and grazing would be likely to occur at Camper Flat and China Flat areas along the Rubicon River, and destination lakes with meadow areas including Lake Schmidel, Lois Lake, and Upper and Lower Doris Lakes. Visitor presence also affects grazing permittee operations. Some visitors enjoy the presence of cattle in the wilderness and wish to see historical use continued.

Livestock operations within specific allotments are guided by direction in approved grazing permits. The Forest Plans provide overall direction for grazing permits by providing standards and guidelines appropriate for protection of the wilderness resource.

3. Water Quality

Current use and management practices may be creating unacceptable water quality conditions in Desolation Wilderness.

The Act designating Desolation Wilderness lists the waters of the area as distinguishing features. There are over 130 lakes within the wilderness. These lakes are primary attractants to visitors, resulting in concentrated use at lake shores. The waters flow into the American River system or into the Lake Tahoe Basin. The waters flowing into the Basin must meet stringent water quality standards. In addition, changes in water quality may affect aquatic ecosystems.

There are concerns that water quality in the wilderness is being affected by a variety of factors. Grazing, trail placement and maintenance standards, and visitor and recreational stock use in riparian areas may increase erosion, thereby increasing sedimentation of waters and changes in the basic ecology of the lakes. Grazing and improper human waste disposal may also be affecting water quality. Over three quarters of the campsites within Desolation are within 100 ft. of water, increasing potential for water pollution from erosion, fecal matter and litter. There is a lack of extensive data showing a correlation between visitor use and contamination of wilderness waters.

RECREATION USE AND ADMINISTRATION

4. Wood Fires

A ban on wood fires within the Desolation Wilderness was initiated in 1990 to protect the wilderness resource. The ban is scheduled for review in this planning process and a final determination will be made.

Snags and down woody debris are an integral part of natural ecosystems, providing habitat for invertebrates and small mammals as well as cycling nutrients and maintaining structure within the soil. There is a concern that firewood collection around popular lakes has damaged snags and green trees and eliminated down woody debris. Many open, glaciated areas have little wood available. In addition, campfires can sterilize the soil for long periods of time.

Many campsites had multiple fire rings and numerous lakes are still surrounded by fire rings. For example, before the campfire ban and the dismantling of fire rings, there were over 100 fire rings within 50 feet of the shoreline at Lake of the Woods. The charcoal, ashes, blackened rocks and half-burned litter associated with campfires can degrade campsites. However, many visitors to Desolation value campfires as part of their wilderness experience.

5. Visitor Impacts

Some areas of the wilderness, especially lake shores, riparian zones and easily accessible destinations are being damaged by visitor use.

Wilderness users, including backpackers, day hikers and recreational stock are impacting the wilderness resource. The physical effects of use can include devegetation of riparian areas, the loss of soil litter and duff layers, soil compaction, damage to cultural resource sites, and increased erosion. Heavy foot traffic has led to the creation of numerous social trails in popular areas, which leads to increased vegetation damage and erosion. In addition, recreational stock use leads to larger campsites and damage to shrubs and trees.

Some users are concerned that they do not often see wildlife and attribute scarcity of animals to visitor use.

Most campsites in Desolation Wilderness are within 100 feet of lake shores or streams due to either geographical features or user preference. These campsites are preferred by many backpackers, yet many of these campsites are located in sensitive riparian areas. In addition, campsites which are close to water are often more visible and therefore more intrusive to others. Attempts to move campsites away from water to pristine areas could result in a greater number of impacted areas than allowing the same amount of use to concentrate on already impacted sites. Some campsites close to water, such as campsites on granite bedrock, are resistant to impacts while others are in easily impacted locations such as moist meadows. Campsite durability and screening may be as important in selecting the best locations for campsites as proximity to water.

6. Quotas and Group Size

The number and distribution of overnight and day users and the size of groups (including stock) affects the values and character of Desolation wilderness and also the wilderness experience of users.

The amount of use occurring in Desolation Wilderness is in conflict with the 1964 Wilderness Act, which states that wilderness will have outstanding opportunities for solitude or a primitive and unconfined type of recreation. The Act mandates that wilderness be managed and protected to preserve its natural conditions; it mandates that wilderness resources be left unimpaired for future use and enjoyment.

In 1978 a trailhead quota was instituted for overnight users as a means of protecting wilderness resources and to enhance the wilderness experience of visitors. Since that time, backpacking use has changed. Backpackers now tend to take trips of shorter duration, and they tend to camp at one location for multiple nights rather than moving camp each night. Campsites which have been damaged by use are extremely slow to recover. There is concern that the current overnight quota system is allowing continued degradation of popular destinations.

Day use of the wilderness has increased by 200 percent over the last 12 years. There are resulting social and physical impacts, especially in easily accessible areas. For example, over 900 people have been counted using Eagle Lake on a single day. There is concern that the level of current use is exceeding that acceptable under the mandate of the 1964 Wilderness Act. Some are concerned that "outstanding opportunities for solitude" are not provided. Others are concerned that heavily used areas are suffering long term damage to such resources as soil and vegetation. On the other hand, many wilderness visitors do not notice resource damage and report satisfaction with their visit.

The size of any particular group can affect both the experience of other users and the amount of physical damage to soil and vegetation. Many wilderness visitors are disturbed more by meeting a single large group (12 or more people) per day than up to ten small groups. Many wilderness visitors feel that large groups are an intrusion on their wilderness experience. In addition, large groups spread out more on trails and at campsites, creating more damage to soils and vegetation. On the other hand, some organizations feel that large groups should be allowed in the wilderness to increase recreational opportunities.

Included in this issue is a discussion of the appropriate guidelines for allowing commercial use (outfitters, guides and others) within a heavily used wilderness such as Desolation.

7. Aircraft Overflights

Aircraft Over flights, common in Desolation Wilderness, adversely affect the wilderness experience of wilderness users.

Current FAA regulations provide a recommended minimum ceiling over designated wilderness. This recommended ceiling is often violated by private and military aircraft. In addition, two utilities, Pacific Gas and Electric (PG&E) and the Sacramento Municipal Utility District (SMUD), have flights authorized by the current Forest Plan to service their Federal Energy Regulatory Commission (FERC) licensed facilities at Lake Aloha and Rubicon Reservoirs. These two reservoirs are excluded from wilderness designation, but are to be managed in a manner consistent with the surrounding wilderness. SMUD has requested that their allowed flights be increased from 4 to 8 per year.

Management approaches to using helicopters in fire suppression and search and rescue activities differ on the two forests. There is a need for approaches to be consistent for the wilderness as a whole.

8. Dogs

Disturbance by dogs may necessitate their regulation in Desolation Wilderness.

Many wilderness visitors bring dogs into the wilderness. There are concerns that dogs detract from the wilderness experience of visitors by barking and add to sanitation problems in popular areas. In addition, unleashed dogs may harass wildlife. Some persons feel that dogs are inappropriate in the wilderness; others feel that dogs should be allowed.

9. Trails

Management and development of trailheads and trails both accessing and within the wilderness (including location, maintenance and signing) may affect the amounts and patterns of wilderness use and the wilderness experience of visitors.

There is a concern that the trails network servicing Desolation Wilderness be managed to provide sufficient access throughout the wilderness while protecting wilderness resources. Some visitors advocate additional trails and improved maintenance standards. Others feel that there should be no trails inside Desolation Wilderness or that maintenance of existing trails should be oriented towards correcting resource damage and reducing erosion. Some feel that trail construction should be geared towards accommodating heavy use. Others feel that current trail conditions are too developed for wilderness and feel that maintenance and reconstruction should provide a wilderness level experience. Desolation Wilderness is one of the most heavily trailed wilderness areas in the country. Additional and improved access to little used areas would lead to the creation of additional campsites and impacts in once pristine areas.

Included in this issue is a discussion of trailhead development. Some users would like improved trailhead facilities with restrooms, dumpsters and stock pens. Others feel that trailheads should be primitive, in keeping with their wilderness access, or should have limited parking space as a deterrent to increased use.

OPPORTUNITIES

The following opportunity has been identified:

The Eldorado and the LTBMU have identified the need to provide consistent standards and guidelines language for Air Quality in the two Forest Plans. Federal laws mandate the protection of Class I Air Quality standards. Each LRMP has language regarding protection of the Class I airshed, however, the language in each plan is somewhat different. This planning process will result in consistent language for Air Quality Standards for the two LRMPs.

I. DECISION TO BE MADE

The responsible officials for this DEIS are the Forest Supervisors for the Eldorado National Forest and the Lake Tahoe Basin Management Unit. The analysis in the EIS will lead to a decision either to adopt new management guidelines or to continue existing management (No Action). The decision to adopt new management guidelines will amend both the Eldorado and the Lake Tahoe Basin Management Unit LRMPs.

Chapter 2

THE ALTERNATIVES

CHAPTER II - THE ALTERNATIVES

A. INTRODUCTION

The purpose and need for action were discussed in Chapter I. Chapter II describes six alternatives for addressing this purpose and need, including the alternative of taking no action. The alternatives were developed by the Interdisciplinary (ID) Team assembled for this project. This group of specialists has expertise in the various resources related to the issues presented in Chapter I, knowledge of the unique characteristics of the Desolation Wilderness, and awareness of the management mandates of the Wilderness Act. The ID Team developed the range of alternatives from the issue statements which were distilled from public scoping. The range of alternatives is meant to represent a range of methods for addressing the viewpoints that various interested parties expressed in relation to the issues.

In developing and evaluating the action alternatives, the ID team was aware that activities which are acceptable in the general forest may produce impacts which are considered unacceptable in wilderness. In addition, due to differences in geology, soils, elevation, vegetation, etc., activities that produce impacts to the Desolation Wilderness would not necessarily produce impacts to other wilderness or non-wilderness areas and vice versa. Consequently, the five action alternatives and relevant management considerations (management requirements and mitigation measures) developed by the ID team are specific to the Desolation Wilderness.

B. DESIRED FUTURE CONDITIONS

1. THE LIMITS OF ACCEPTABLE CHANGE PLANNING PROCESS

The Limits of Acceptable Change (LAC) planning process (Stanky et al. 1985) has been used to develop the alternatives considered in this DEIS. The LAC process recognizes that recreation use, even light use, will result in some impact to wilderness conditions. The 1964 Wilderness Act provides for legitimate uses of wilderness. This planning process recognizes that human-caused change will occur, but provides a system for determining what amounts of change are acceptable in various portions of the wilderness. In this process, desired future conditions are described as acceptable amounts of change from natural conditions. Where current conditions do not meet the desired future conditions, corrective management actions will be taken.

The LAC process consists of four major components: 1) the specification of acceptable and achievable resource and social conditions, defined by a set of measurable indicators; 2) an analysis of the relationship between existing conditions and acceptable conditions; 3) identification and implementation of management actions necessary to achieve acceptable conditions; and 4) a program of monitoring and evaluation of management effectiveness. These four components are further broken down into nine steps which include the identification of issues and concerns, initiated during the public involvement phase of this DEIS.

The LAC process utilizes the concept of Opportunity Classes. Wilderness Opportunity Classes describe the relative "purity" of different areas of the wilderness based on current overall conditions. They also define the different levels of resource, social, and management conditions acceptable for each Opportunity Class in the spectrum.

Opportunity Class definitions for the Desolation were developed by the Interdisciplinary Team (IDT) through analysis of public comments, examples from other wilderness areas, and input from wilderness researchers. Four Opportunity Classes, numbered I-IV, are defined on the following pages. Opportunity Class I is the most pristine of the four, Class IV is the least pristine and would be typically found in portal areas of the wilderness.

The thirteen current management zones within the Desolation were subdivided into forty-five zones. The new zone boundaries correspond generally to topographic features such as ridge lines and lake basins, and to different levels of use. The IDT allocated one of the four Opportunity Class descriptions to each of the identified zones. Each of the five action alternatives proposes a different mixture of these Opportunity Class allocations. The Desolation currently does not have Opportunity Class allocations, and that situation would continue under the No Action Alternative (Alternative 2).

The LAC planning process involves identifying "indicators" that measure the desired social and resource conditions for each Opportunity Class. While Opportunity Class descriptions provide qualitative information on the desired future conditions for each area, indicators provide the means by which to determine if those conditions are being met. Measurable limits, or "standards", are set for each indicator.

2. OPPORTUNITY CLASS DESCRIPTIONS

These descriptions set the desired future condition for each of the Opportunity Classes. In each alternative these descriptions and their associated indicator standards are applied to zones as shown on the Alternative Maps.

CLASS I

SOCIAL

The area in this Opportunity Class provides outstanding opportunities for isolation and solitude free from evidence of human activities. Encounters with other users are very infrequent. The visitor has outstanding opportunities to travel cross-country utilizing a maximum degree of outdoor skills. This environment offers a very high degree of challenge, self-reliance, and risk. Inter-party contacts are very few while traveling and rare to none at the campsite.

RESOURCE

The area is characterized by an unmodified natural environment. Ecological and natural processes are not measurably affected by the actions of users. Environmental impacts are minimal, restricted to temporary loss of vegetation where camping. These areas typically recover on an annual basis, and are subtle in nature and not apparent to most visitors.

Range: Ecological condition meets Desired Condition*, and the trend is stable to upward. There is no degradation of physical or cultural resources. *Desired conditions is defined as "A portrayal of land or resource conditions which are expected to result if planning goals and objectives are fully achieved." This would reflect a species composition greater than or equal to 50% decreaser or increaser species, with at least 30% made up of decreaser species. Lesser condition ratings include "At risk" and "Unhealthy".

Wildlife: Wildlife behavior and habitat use patterns show no noticeable alteration. Habitat diversity is maintained entirely through natural forces, such as fire, insects, and forest disease, etc. (as opposed to unnatural methods, such as use of pesticides, thinning of timber stands, etc.).

Water Quality: Water quality shows no measurable degradation as measured by standard tests.

Campsites: Campsites are not evident; no fire rings are present and campsites do not exhibit noticeable bare soil or loss of vegetation.

Riparian areas: Riparian, lake shore and stream channel conditions show no measurable degradation due to human uses.

Vegetation/Soil Condition: There is no noticeable vegetation loss or alteration of the duff and litter layer on campsites and livestock areas. Very few campsites exist. There is no evidence of recreational stock use, such as: dishing, root exposure, scars and broken branches, or damage to vegetation and soils from trampling.

Trails: There are few or no constructed trails. Existing user-created trails are minimal; the formation of new user-created trails is not permitted. No special accommodations are made for pack stock. The Pacific Crest Trail will be maintained to National Scenic Trail standards.

MANAGERIAL

Management strongly emphasizes sustaining and enhancing the natural ecosystem. Signs may be present for resource protection only. New trails will not be constructed; others may be abandoned. Trail maintenance level will retain a primitive condition requiring a high degree of skill and challenge to travel. Trails will be maintained only for resource protection and protection of the trail investment. No administrative structures, or user facilities will be provided or permitted.

Direct on-site management of visitors seldom occurs. Necessary rules and regulations are communicated to visitors outside the area, usually at trailheads, Visitor Information Centers, or Ranger Stations. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefits to all; these programs will be conducted outside the wilderness. Visitor contact by Wilderness Rangers is primarily to check wilderness permits and in reaction to unacceptable impacts. Patrols and monitoring of conditions by appropriate State and Federal agency personnel is conducted only as necessary to achieve management objectives. All scientific and ecological monitoring actions will be scheduled to meet social setting criteria. Formal rules and regulations, and permit quotas will be necessary to achieve management objectives.

CLASS II

SOCIAL

A high probability exists for experiencing isolation from the sights and sounds of human activities. Encounters with other users are low. The user has good opportunities for experiencing independence, closeness to nature, tranquillity, and self-reliance through the application of primitive recreation skills. These opportunities occur in an environment that offers a high degree of challenge and risk. Inter party contacts are low on the trail and at campsites.

RESOURCE

The area is characterized by an essentially unmodified natural environment. Ecological and natural processes are minimally affected by the action of users. Environmental impacts are low and restricted to minor losses of vegetation where camping occurs and along most travel routes. Most impacts recover on an annual basis and are apparent to a low number of visitors.

Range: Ecological condition meets Desired Condition, with a stable to upward trend.

Wildlife: No displacement of wildlife occurs during critical periods (nesting, birthing, fawning) and only temporary displacement occurs during non-critical periods. Habitat diversity is maintained entirely through natural forces, such as fire, insects, and forest disease.

Water Quality: There is no cumulative degradation of water quality as measured by standard tests.

Riparian Areas: Riparian, lake shore and stream channel conditions show temporary changes at very localized sites which could be expected to recover annually.

Campsites: There is a low concentration of campsites, most having a small barren core allowed for 1 or 2 tent pads. Core areas are expected to persist from year to year.

Vegetation/Soil Condition: Localized, site-specific soil compaction, loss of duff and litter, and erosion are minimal on campsites, social trails and livestock areas. Evidence of recreational stock use is not apparent to the casual user. Impacts do not generally persist more than one year. Recreational pack stock impacts occur on no more than 5% of total campsites.

Trails: There are few constructed trails. Existing user-created trails are limited; the formation of new user-created trails is not permitted. No special accommodations are made for pack stock.

MANAGERIAL

Management emphasizes sustaining and enhancing the natural ecosystem. Signing is minimal: it is provided only for resource protection and direction at major trail intersections. Trails are typically reconstructed, maintained and managed to accommodate light and infrequent travel. Trail routes provide the user with an opportunity for testing skills and experiencing a sensation of physical exertion and a feeling of accomplishment. Trails will be maintained only for resource protection, protection of the trail investment, and minimal user safety. New trails will not be constructed; others may be abandoned. No administrative structures, or user facilities will be provided or permitted.

Direct on-site management involves minimum visitor contact. Necessary rules and regulations are communicated to visitors outside the area, such as at trailheads, Visitor Information Centers, or Ranger Stations. Visitor contact by Wilderness Rangers is primarily to check wilderness permits, and in reaction to unacceptable impacts. Formal and informal user education programs will be initiated to inform users about what to expect and how to use the area for optimum benefit to all; these programs will occur outside the wilderness area. Formal rules, regulations, and permit quotas will be necessary to achieve management objectives.

CLASS III

SOCIAL

Moderate opportunities for exploring and experiencing isolation from the sights and sounds of human activities are found in this area. The probability of encountering other users is moderately frequent, both along trails and at the campsite. The visitor has moderate opportunities for experiencing independence, closeness to nature, and tranquillity through the application of primitive recreation skills. These opportunities occur in an environment that normally offers a moderate degree of challenge and risk.

RESOURCE

The area is characterized by an essentially unmodified natural environment. In a few areas, ecological and natural processes are moderately affected by the actions of users. Environmental impacts are moderate, with most areas along travel routes and near campsites showing vegetation loss. Impacts in some areas often persist from year to year and are apparent to a moderate number of visitors.

Range: Ecological condition meets Desired Condition, with a stable to upward trend.

Wildlife: No species listed as threatened, endangered, or sensitive are displaced during critical breeding periods. Non-listed wildlife experience temporary displacement. Habitat diversity is maintained entirely through natural forces (fire, insects, disease, etc.).

Water Quality: Temporary changes in water quality may occur, but there is no cumulative degradation over a 3 year period, as measured by standardized tests.

Riparian Areas: Riparian, lake shore and stream channel conditions show temporary changes which could be expected to persist from year to year at some sites. The measurable effects of changes would be expected to persist from 1 to 5 years.

Campsites: Most sites have a barren area around the campsite center and tent pads. This unvegetated area persists from year to year. There is a moderate concentration of campsites, with the total number of sites high enough to accommodate peak use in order to prevent the creation of new sites. Some campsites are within sight and/or sound of each other.

Vegetation/Soil Condition: There is moderate soil compaction and minimal erosion on some campsites, social trails, and areas used by recreational livestock. Evidence of recreational livestock use is expected to persist from year to year, and occurs on no more than 5% of the total number of campsites.

Trails: The system trail network is moderately developed. Social trails are visible around popular lakes destinations; however, the formation of new user-created trails is not permitted.

MANAGERIAL

Management emphasizes maintaining and enhancing the natural ecosystem. Trails are typically reconstructed, maintained, and managed to accommodate moderate use for the majority of the use season. Trails only modify natural conditions to the extent necessary to protect the resource, protect the trail investment, and to provide for moderately safe use by visitors with average physical ability. Trail routes provide the user with an opportunity for testing skills and experiencing a sensation of physical exertion and a feeling of accomplishment. New trails will not be constructed. Signing is minimal: it is provided only for resource protection and minimal direction at major trail intersections. No administrative structures, or user facilities will be provided or permitted.

On-site management involves moderate visitor contact. Contact is initiated by Forest Service personnel during routine duties. Necessary rules and regulations are communicated to visitors outside the area, such as at trailheads, Visitor Information Centers, and Ranger Stations. In addition to checking wilderness permits and addressing unacceptable impacts, field personnel may also provide information concerning protection of site-specific wilderness resources. Formal and informal

user education programs will be initiated to inform visitors about what to expect and how to use the area for optimum benefit to all. These programs will be conducted outside the wilderness area. Formal rules and regulations, and permit quotas will be necessary to achieve management objectives.

CLASS IV

SOCIAL

Opportunities for exploring and experiencing isolation from the sights and sounds of human activities are moderate to low. The probability of encountering other users is moderate to high. The user has some opportunity for interaction with the natural environment, often with low to moderate challenge and risk. Contact with other users is relatively high much of the time, both on the trail and at campsites. Some parties may camp out of sight and sound of other parties, but this is not a common experience during the high use season.

RESOURCE

This area is characterized by a predominantly unmodified natural environment. Natural conditions in some areas may be substantially affected by the actions of users. Environmental impacts are relatively high, especially at entry points, along travel routes, and at campsites. Most impacts, such as vegetation loss and soil compaction, persist from year to year and are apparent to most visitors.

Range: Ecological condition meets Desired Condition, with a stable to upward trend.

Wildlife: Threatened and endangered species are not displaced during critical breeding periods. Displacement of non-listed wildlife or alteration of behavior is expected to occur within 200 yards of trail systems and camping areas during the high-use season. Habitat diversity is maintained entirely through natural forces, such as fire, insects, and forest disease.

Water Quality: There are temporary changes in water quality, but degradation is not cumulative over 5 years, as measured by standard tests.

Riparian Areas: Riparian, lake shore and stream channel conditions show temporary changes which could be expected to persist from year to year at some sites. The measurable effects of changes would be expected to persist up to 10 years.

Campsites: Concentration of campsites is moderately high. The number of sites accommodates peak use in order to prevent the formation of new sites. Many sites are within sight and sound of others. A barren core exists on most sites and persists from year to year.

Vegetation/Soil Condition: Moderate soil compaction and loss of vegetation, litter and duff is expected on many visitor-created trails, camp areas, and areas used by livestock. Impacts from recreational stock users are apparent to most users and

could be expected to persist from year to year on some sites. Minimal erosion occurs on the disturbed sites.

Trails: The system trails are well developed. There are numerous existing user-created trails; new user-created trails are not permitted.

MANAGERIAL

Management emphasizes sustaining and protecting natural ecosystems. Trails are typically reconstructed, maintained, and managed to accommodate heavy traffic for the majority of the use season. Trails will be managed to modify natural conditions only to the extent necessary to protect the resource, protect the trail investment, and provide for reasonably safe use by a user with average physical ability. Trail routes provide the user with an opportunity for testing skills and experiencing a sensation of physical exertion and a feeling of accomplishment. New trails are not constructed. Signing is minimal. Signing is provided only for resource protection, and minimal directional signing is provided at major intersections. No administrative structures, or user facilities will be provided or permitted.

On-site management involves frequent visitor contacts. Special efforts are taken by Forest Service personnel to contact visitors. Necessary rules and regulations will be communicated to visitors outside the area, such as at trailheads, Visitor Information Centers, and Ranger Stations. Information concerning protection of site-specific wilderness resources and regulations will also be presented by field personnel inside the area. Formal and informal user education programs will be initiated to inform visitors about what to expect and how to use the area for optimum benefit to all; these programs will be conducted outside the wilderness area. Formal rules and regulations, and permit quotas will be necessary to achieve management objectives.

3. INDICATORS AND STANDARDS

Indicators are selected as a means to assess the desired conditions in each zone. Indicators are selected based on a number of criteria. They must be quantifiable. Indicators are reflective of more than one condition. For example, changes in campsite barren core areas would be a measure of more than loss of plant cover at campsites; they would also reflect changes in the number of social trails, changes in recreation damage to lake shores, and changes in levels of recreational use. Indicators should be responsive to management conditions and they should be traceable to a causal agent. They may function as an early warning of long-term disturbance to ecosystem conditions. Finally, they should be reliably and feasibly measured. Indicators selected by the team have been used successfully in other wilderness areas.

The indicator standards are the thresholds for acceptable conditions in each Opportunity Class. They establish a basis for identifying needed management actions in areas where actual conditions are in conflict with those selected as the desired conditions.

INDICATOR: Number of groups encountered per day while traveling.

This indicator has been selected to measure the solitude available while traveling within the wilderness. The indicator will be measured through a combination of techniques including visitor surveys, observations by wilderness rangers and volunteers, informal conversations with users, and use level records.

STANDARDS

Opportunity Class	Average # groups encountered per day over the high use season.	Maximum # groups encountered per day over the high use season.
1. (Most Primitive)	0. 5	2
2.	2	4
3.	4	8
4. (Least Primitive)	15	20

INDICATOR: Number of occupied campsites within sight or sound of a campsite.

This indicator provides a measure of campsite solitude. It is also indicative of campsite density, campsite location, and use levels in specific locations. Wilderness staff and volunteers will measure the indicator through direct observation and/or informal conversations with visitors at their campsites.

STANDARDS

Opportunity Class	Number of occupied campsites within sight or sound
1. (Most Primitive)	0
2.	1
3.	2
4. (Least Primitive)	3

INDICATOR: Maximum square feet of devegetated area in campsites.

Devegetated campsite area is an indicator of soil compaction and vegetation change, and indirectly, of possible erosion, amount and type of use, and user behavior. This indicator will be measured by staff and volunteers on the campsite inventory form.

STANDARDS

Opportunity Class	Maximum Sq. Ft. devegetated area per campsite
1. (Most Primitive)	0
2.	100
3.	300
4. (Least Primitive)	900

INDICATOR: Frissell Campsite Condition

This indicator will be added to ongoing campsite monitoring because it is particularly reliable in measuring trends in conditions over time.

Additional campsites would be inventoried by: mapping campsites; recording locations; measuring distance from water, trail and other sites; recording visibility/screening; and rating the site using the modified Frissel campsite condition classification system below:

STANDARDS

Opportunity.	Campsite Condition Class Ratings
1.	Generally only type A sites are allowed to form in this Opportunity Class. Any increase in type B sites greater than 10% of the total number of sites in the area will initiate actions.
2.	Generally only type A and B sites are allowed to form. Type C sites will not exceed 25% of the total number of sites in the area.
3.	Only type A, B and C sites allowed to form. Type C sites will not exceed 50% of the total number of sites. Formation of type D sites will initiate actions.
4.	No type E sites are allowed to form. Type D sites will not exceed 50% of the total number of sites.

Campsite Condition Class descriptions:

A. Ground vegetation is flattened, but not permanently injured. Minimal physical change except for possibly a simple rock fire ring.
B. Ground vegetation is worn away around the fireplace or center of activity.
C. Ground vegetation is lost on most of site, but duff and litter is present in all but a few areas.
D. Bare mineral soil is widespread. Tree roots exposed on the surface.
E. Soil erosion is obvious.

INDICATOR: Number of User Created Trails

User created trails will be used as an indicator of new impacts in both high use and cross country areas. These trails often multiply in heavy use areas as users access lakes, streams, and sites of particular interest. In cross country areas these trails may appear due to concentrated use of specific routes . The user created trails will be counted and mapped in areas of concern. The initial number of user created trails will establish a baseline.

STANDARDS

Not to exceed the existing (baseline) number of user created trails in any area of concern.

The following indicators measure conditions that may be affected by cattle and/or recreational livestock.

These standards to all Opportunity Classes. The indicators for lake shore and stream conditions, and for woody riparian species are designed to protect riparian areas. Riparian areas include all wet meadows and areas within 100 feet of perennial streams (stream class I, II, and III) and ponds, lakes or reservoirs, or within 50 feet of intermittent streams (stream class IV). Any future forest-wide direction developed by the Forests that provides better standards and guidelines for riparian resources will supersede this direction.

INDICATOR: Ecological condition, and trend

Ecological Condition and Trend indicators provide measurements which reflect changes from potential natural conditions for soils and vegetation.

Ecological condition is the character of the vegetation cover and soil in relation to the potential of the natural community. This indicator typically measures vegetation and soil changes associated with livestock grazing. Trend measures change in the ecological status; if the change is towards the natural potential of the community, the trend is considered to be upward. These will be measured using standard USFS Region 5 range monitoring procedures (Draft R-5 FSH 2209.21).

STANDARD

Opportunity Classes	Ecological Condition	Trend
1- 4	Desired Condition*	Stable/upward

*Desired condition is defined as "A portrayal of land or resource conditions which are expected to result if planning goals and objectives are fully achieved." This would reflect a species composition greater than or equal to 50% decreaser or increaser species, with at least 30% made up of decreaser species. Lesser condition ratings include "Between" and "Unhealthy".

INDICATOR: Utilization of Herbaceous Species

Utilization is a predetermined amount of current forage production that is to be removed by grazing. The acceptable degree of utilization will vary depending on such factors as rangeland type, rangeland condition and trend, season of use, topography, soil type, and physiological needs of various plant species.

Based on site specific circumstances, utilization will be determined by using guidelines provided in the Forest Service Region 5 Draft Range Analysis Field Guide (FSH 2209.21) and 1996 Interagency Rangeland Monitoring Utilization Studies.

STANDARDS

The amount of utilization deemed allowable based on the site specific factors listed in the Region 5 Range Analysis Field Guide.

INDICATOR: Soil Disturbance

Soil disturbance is characterized by both soil displacement and compaction. Soil displacement is a factor of concern on light or loose soils, particularly on slopes. Compaction is common on fine-textured soils and level or moist areas. This effect of grazing may become critical before allowable utilization of key species is attained. The sensitivity of ecosystems to soil displacement will vary depending on such factors as rangeland type, rangeland condition and trend, season of use, topography, soil type, and physiological needs of various plant species.

The acceptable degree of soil displacement and compaction will be assessed based on site specific soil texture and slope conditions, using guidelines provided in the Forest Service Region 5 Range Analysis Field Guide. (Draft R-5 FSH 2209.21)

STANDARDS

The amount of soil disturbance deemed allowable based on soil texture factors listed in the Region 5 Range Analysis Field Guide, and site specific slope characteristics.

INDICATOR: Lake shore and Stream Channel Conditions

Lake shore and stream channel conditions within the Desolation will be in healthy condition with respect to their natural potential. This will be assessed by measuring trampling and chiseling on lake shores and stream banks. Trampling and chiseling are a measure of the degree of livestock utilization and the extent of livestock damage along a stream reach or lake shore. Trampling refers to soil compaction or disturbance caused by hooves, and chiseling refers to cuts in stream banks and shorelines caused by hooves. This indicator provides information on erosion, water quality changes, and changes to aquatic ecosystem health.

STANDARD

Opportunity Classes	Trampling & Chiseling Occurrence
1 - 4	≤20% of any stream reach or lake shore

INDICATOR: Utilization of Woody Riparian Species

Grazing in the Desolation primarily takes place in riparian areas. Woody riparian species are often important components of these areas. Grazing sites within the Desolation containing willow populations will be monitored to determine the percentage of willows browsed by livestock and deer. This indicator provides measures of changes to habitat for riparian dependent species and changes to aquatic ecosystem health.

STANDARD

Opportunity Classes	Utilization of Willows by Livestock & Deer
1 - 4	≤20% of current years growth

C. MANAGEMENT CONSIDERATIONS COMMON TO ALL ALTERNATIVES

A "No Action" alternative and five "action" alternatives were considered in detail and are described in this section. Management assumptions and actions which are common to *all* alternatives or common to the *action* alternatives are listed first in order to avoid further duplication.

1. Management Assumptions

a. Demand for recreational opportunities within the Desolation Wilderness will continue to grow in the future. This growth will concentrate on the easily accessed southwest and southeast sides with slower growth in the northwest and northeast.

b. Unconstrained day use of the Desolation Wilderness will result in increased physical and social resource deterioration.

c. The Eldorado National Forest and the Lake Tahoe Basin Management Unit will continue to share administrative responsibility for the management of the Desolation Wilderness. Administration will be achieved through yearly coordination between the two forests.

d. Population growth in the Sacramento Valley, Reno, Carson City, and San Francisco will continue to expand, along with demands for transportation, power, services, etc. that contribute to air pollution in the Desolation Wilderness.

2. Management Direction

To meet current Forest Service policy for wilderness management, the following direction will be implemented in all alternatives. This section includes elements currently in either the Eldorado or Lake Tahoe Basin Management Unit LRMPs.

a. Physical/Biological Elements

Hydrology and Water Quality

Prohibit use of soaps, detergents, foodstuffs, or any contaminants in wilderness waters.

Stream bed restoration will occur only in areas where degradation has occurred as a result of human activity.

Work with appropriate agencies to develop a program of water releases to maintain scenically pleasing water levels through the heaviest use season at Aloha and Rubicon Reservoir.

The use of lands within the Desolation Wilderness as target areas for weather modification activities will not be approved unless. 1) the proponent

can provide reasonable, scientifically supportable assurance that his activities will not produce permanent, substantial changes in natural conditions, and 2) the proposal does not include any feature that might reasonably be expected to produce conditions incompatible in appearance with the wilderness environment.

Air Quality

Protect current condition of air quality related values (AQRV's) within the Desolation Wilderness.

Identify and inventory AQRV's. Monitor the effects of air pollution on sensitive receptors to these AQRVs.

Fire, Forest Diseases and Insect Activity

Suppress all wildfires in accordance with FSM 5130 and FSM 2320. When implementing fire suppression activities, protect the integrity of the wilderness resource. Use control methods that are compatible with wilderness management objectives.

Fish, Wildlife and Vegetation

Conserve the natural biodiversity of the wilderness at population, species, and community levels.

Protect all Threatened, Endangered, and Sensitive populations to ensure viability.

Protect riparian areas, meadows and lake shores.

Range

Implement any required changes to allotment management in accordance with permit terms and regulations.

Vacant allotments will remain vacant until environmental analysis for those Allotment Management Plans is completed.

Heritage Resources

Identify and protect cultural properties pursuant to all Federal laws and regulations. Mitigate impacts to significant cultural resource sites through monitoring and other appropriate actions which are consistent with protection of the wilderness resource.

Conduct archeological surveys as needed prior to site specific projects. Establish a survey strategy to expand the data base on high elevation sites. This strategy will prioritize surveys in areas of high visitor use such as lake basins, stream courses, and travel corridors.

b. Recreation Elements

Recreation Use

Human use will be managed.

Limit and monitor impacts at high use areas; regulate or control use at specified areas where damage to vegetation is significant.

Regulate camping use where overuse is contributing to insect attacks. Regulate horse use to prevent damage to vegetation and soil.

All quotas will be allocated on a daily basis.

Both overnight and day users must obtain a wilderness permit for each trip into the wilderness. Wilderness permits will be issued by the Forest Service or one of its cooperators.

The length of stay limit for the Desolation is 14 days.

Under the Fee Pilot Program recently approved by Congress, use fees for overnight use day use and permit reservations for the Desolation may be initiated in 1997.

CFR's prohibiting discharge of firearms in camping areas will continue to be enforced for public safety. If public safety becomes compromised due to use of firearms in other heavily used areas of the Desolation Wilderness, these areas may be closed to shooting (both hunting and recreational shooting) by means of a Forest Order.

c. Managerial Elements

Wilderness Administration and Planning

Consider activities on both sides of the wilderness boundary during planning. Articulate management goals and the blending of diverse resources in forest plans. Do not maintain buffer strips of undeveloped wild land to provide an informal extension of wilderness. Do not maintain internal buffer zones that degrade wilderness values.

Required site-specific surveys and environmental analysis will be completed before the initiation of wilderness projects (examples include trail construction, and re-construction, outhouse construction, and designation of campsites).

Use Authorizations

Commercial operations will be authorized only with a valid special use permit.

When not reasonably accessible by horseback, the following flights are authorized:

1. Natural Resources Conservation Service - Two flights per year to read snow survey courses at Lake Lucille and Rubicon Peak.
2. U.S. Geological Survey - Six flights per year to maintain stream gauges and the Lake Lois Snow Pillow.
3. Sacramento Municipal Utility District - Four flights per year to maintain FERC licensed facilities at Rubicon Reservoir.
4. FERC Project 184 Licensee - one flight per year to maintain FERC licensed facilities at Lake Aloha.

Flights necessary to perform major maintenance work at FERC licensed facilities will be approved on a case-by-case basis.

If a radio repeater must be located within the wilderness, it will be without the use, if possible, of a permanent facility.

Issue permits for mineral information-gathering activity, including prospecting, only for scientific and educational purposes. The gathering of mineral information, including prospecting, is not permitted for recreational activity, for commercial exploration, or for non-commercial purposes.

Issue permits for research contingent upon the need to conduct the study within wilderness for an administrative or research need. Proposals will be jointly reviewed by the wilderness administrator, the Forest Supervisor, a specialist from Pacific Southwest Research Station and the sponsor to determine desirability and feasibility.

Emergency Services

Use of motorized equipment may be approved on a case-by-case basis by the Forest Supervisor when the situation involves an inescapable urgency and temporary need for speed beyond that available by primitive means. The categories include fire suppression, health and safety, law enforcement involving serious crime or fugitive pursuit, removal of deceased persons and aircraft accident investigations.

Information and Education

Provide educational materials at offices and trailheads to explain wilderness use and protection. Encourage "Leave No Trace" wilderness techniques through materials and ranger contacts in the wilderness.

Increase visitor awareness of the challenge inherent in wilderness recreation and the consequent risk involved.

Do not advertise or encourage commercial or non-commercial use of the Desolation. Through the permit system, front desk, newspapers and public education opportunities, redirect visitors seeking a non-wilderness-dependent experience to areas outside of the wilderness.

Forest Service publications will "depublicize" overused wilderness areas.

Forest Service staff will work with independent authors and publishers to develop an understanding of the wilderness resource, improve wilderness manners and depublicize the wilderness.

D. MANAGEMENT REQUIREMENTS/ MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

A number of issues identified in the scoping process lacked widespread interest or controversy. Consistent management is still needed for these issues. This section defines the management guidelines for such issues. The section also provides direction for specific actions needed to make sure that wilderness management objectives are met. General direction for the key issues which is applicable to all alternatives also appears in this section.

1. Physical/Biological Elements

Soils

Monitoring of all campsite and trail conditions will occur, as specified in the monitoring schedule to be developed, and maintenance procedures will be implemented as needed.

All trail construction and maintenance will follow guidelines outlined in the Forest Service Trails Handbook (FSH 2309.18) and the Best Management Practices Handbook (USDA Forest Service 1986).

Hydrology and Water Quality

Any dams identified for breaching and/or removal through agreement with CDFG will be assessed for a determination of potential sediment input before a final decision is made. Any breaching of dams will occur during times when lake levels are at, or below, the natural spillway level.

Air Quality

Proposed major emission sources which might adversely affect the Class I airshed, including sources not on Federal land, will be evaluated. The Forest Officer will make appropriate recommendations in the permitting process, following established Prevention of Significant Deterioration application review procedures.

Cooperate with federal, state and local air regulatory agencies by assessing air quality monitoring needs and developing or revising air quality standards and regulations as needed to protect wilderness resource values.

Smoke from prescribed natural fires and management ignited prescribed fires occurring in or adjacent to the Desolation will be managed in a manner that causes the least impact to the natural range of wilderness air quality related values.

Fire Management

Wildfire

Wildfires under all action alternatives will be suppressed using the confine, contain or control strategies, in accordance with FSM 5130. Surveillance can be an appropriate suppression action when a wildfire is expected to be self-contained within a defined area.

The responsible line officer will appoint a resource advisor for all project wildfires in the wilderness, to ensure that suppression activities are compatible with wilderness management objectives.

It is the responsibility of the assigned line officer, or designated Incident Commander to ensure that each wildfire is out before it is abandoned.

Prescribed Fire

The objectives for prescribed fire are to: 1) Permit lightning fires to play, as nearly as possible their natural ecological role within wilderness; 2) Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness; and 3) Carry out prescribed fire within the natural range of acceptable air quality.

Planned ignitions of prescribed fire will be permitted only if necessary to achieve at least one of the first two objectives listed above. In addition, planned ignitions will be permitted only if the use of prescribed fire or other fuel treatment outside of wilderness is not sufficient to achieve fire management objectives within wilderness, and if lightning-caused fires can not be allowed to burn because they pose serious threats to life and/or property inside wilderness or to life, property, or natural resources outside of wilderness.

Two types of prescribed fires may be approved for use within wilderness: those ignited by lightning and allowed to burn under prescribed conditions (Prescribed Natural Fire Program--PNF) and those ignited by qualified Forest Service officers (management ignited prescribed burns). It is the responsibility of the line officer to ensure that both an approved Fire Management Action Plan and an approved burn plan are in place before implementing either type of wilderness prescribed fire.

A Wilderness Prescribed Fire Strategy will be completed which will implement LRMP direction for prescribed fire and PNF in Desolation. This plan will specify conditions and areas under which natural and/or planned ignitions would be allowed to burn as specified in the record of decision.

The required skills, qualifications and organization to implement a PNF program will be identified in the Wilderness Prescribed Fire Strategy and will be in accordance with FSM 5143 and R5 Supplement 5100-92-4(5140).

A PNF Program will require monitoring to ensure that: wilderness management objectives are being met; that the fire is within the prescription established in the approved burn plan; and that the fire size is within the maximum fire size objective established by the Wilderness Prescribed Fire Strategy. The monitoring crew will consist of a minimum of 2 persons. The Wilderness Prescribed Fire Strategy will identify the skills and training needed to qualify for a monitor position. In 1997, funding for monitoring will be available from a special account established and held at the Regional Office. After 1997, it is expected that fire suppression moneys will be available for monitoring prescribed fires.

Once an escaped prescribed fire has been declared an escape, it cannot be redesignated as a prescribed fire and suppression action must begin immediately.

Annual joint planning and review by both Forests will occur. Continuous interagency and intra-agency coordination of suppression strategies taken; implementation of a PNF program; and any management ignited prescribed fires will occur between the LTBMU, the ENF, and their respective joint agency dispatch centers. The dispatch centers will keep cooperating and affected agencies, and parties involved and informed from the onset, through the use of a Go-No-Go notification checklist. This checklist will be developed as an attachment to the Wilderness Prescribed Fire Strategy.

Vegetation

All existing sensitive plants will receive full protection at current population levels or better. Impacts to sensitive plants will be considered in relocating trails. Campsites may be closed to protect sensitive plants as needed.

Areas where the vegetation resource has been impacted by human uses will be allowed to revegetate naturally if recovery is expected to take less than ten years. Areas where recovery is expected to be longer will be revegetated either through closures or through revegetation techniques and protocol approved by the Aldo Leopold Institute.

Sensitive plant species will be monitored by mapping known occurrences and documenting their conditions over time.

Wildlife

All existing sensitive wildlife species will receive full protection at current population levels or better. Impacts to sensitive species and their habitat will be considered in relocating trails. Campsites may be relocated to protect sensitive species as needed.

Range

Grazing allotments will be administered to minimize conflicts with other resource objectives and to promote a harmonious relationship between livestock grazing activities and the wilderness resource.

Environmental analysis for new permits will determine the appropriate levels of grazing in the portions of those allotments where impacts are occurring on wilderness values such as plant communities, primitive recreation, and wildlife populations or habitat. Analysis will consider the costs and benefits of the amount of forage available, recreational values of the area, improvement or decline in wilderness quality and natural conditions, and other concerns. Allotment Management Plans and new grazing permits will be completed as appropriate.

Heritage Resources

The cabin at China Flat will be removed after consultation with the California State Office of Historic Preservation and the Advisory Council on Historic Preservation, and after all impacts are mitigated, unless the Regional Forester determines that the cabin is essential to cultural resource management (FSM 2323.83). Forest staff will explore the feasibility of relocating the cabin to an interpretive site outside the wilderness.

2. Recreation Elements

Wilderness Quality

Any improvements for recreation use must be necessary for the protection of the wilderness resource, not for the convenience of users. They will be constructed of materials which harmonize with the wilderness resource and be subject to approval by the Regional Forester.

Structures built by recreation users that do not conform to the letter or intent of the Wilderness Act will be dismantled.

Motorized and mechanized wilderness trespasses will be actively prosecuted.

Permit/Quota System

Changes to the quota system are proposed for the high use season as defined in the action alternatives. Changes will be implemented one year after the record of decision for the revised guidelines is signed.

Quotas may be adjusted annually as necessary to achieve or maintain desired conditions. Upward adjustments in quotas will be in minimal increments. Consistent monitoring of resource conditions and encounter levels will allow empirical determination of the maximum use level that will meet opportunity class standards for physical and social conditions. If monitoring

indicates a need, the quota season may be extended in heavily used management zones.

Where day use is affected by a quota, the use will be limited through the number of permits issued for the trailhead. Trailheads affected by a day use quota may receive a set number of permits each morning for first-come/first serve self-service issuance. If public demand exists, up to 75 percent of the Day use permits may be made available on a reservation basis.

The potential for contracting with private enterprise to manage the permit reservation system will be evaluated. If this option is selected, a formal prospectus will be used to solicit bids for this service.

Compliance with permit requirements will be monitored by wilderness rangers during patrols. During the first year of implementation, normal response to permit non-compliance (due to permit requirement changes) will be issuance of a warning. In subsequent years, non-compliance will be handled through normal procedures for issuing violation notices.

Outfitter/guides

Within the ceiling established in each alternative, commercial special use permits which are allowed must be shown to meet an identified public need which is wilderness dependent. Permitted outfitter/guide use should benefit the wilderness resource, either through wilderness education of clients or physical restoration activities provided by the permittee.

Commercial guide services are defined as those "providing services or assistance (such as supervision, protection, education, training, packing, touring, subsistence, interpretation, or other assistance to individuals or groups in their pursuit of a natural resource-based outdoor activity) for pecuniary remuneration or other gain. The term 'guide' includes the holder's employees, agents, and instructors". Outfitting is defined as "providing, through rental or livery, any saddle or pack animal, vehicle or boat, tents or camp gear, or similar supplies or equipment, for pecuniary remuneration or other gain. The term 'outfitter' includes the holder's employees, agents, or instructors. Outfitter or guiding operations which are part of commercial public service site operations (such as a pack station, lodge, or resort) will be administered under the site's annual operating plan." (FSH 2709.11)

Upon adoption of revised management guidelines, a formal prospectus will be issued to solicit bids for any new outfitter/guide services that may be allowed for the following year. Such Special Use Permits will be awarded based on the applicant's past experience and performance, financial capability, economic viability, ability to provide the needed service, knowledge of wilderness values, and "Leave No Trace" use ethics.

Administration of Special Use Permits for commercial use will follow the objectives and procedures outlined in the Forest Service Special Uses Handbook (FSH 2709.11).

Permitted outfitter/guides will be allowed to operate on both an allocated and a non-allocated basis. Camps leading trips into the wilderness will operate on an allocated basis only. Each outfitter/guide or camp will be permitted a set number of allocated service days each year. For allocated trips, outfitter/guides will submit proposed trip dates and locations to the Forest Service for approval. Those trips will receive priority if they are scheduled prior to dates when reservations are made available to the general public for the dates requested. Trips which the outfitter/guides request after reservations are available to the general public will be awarded on a space available basis. The Forest Service will not charge a reservation fee for scheduling allocated trips. The outfitter/guides will be responsible for payment of any wilderness reservation, permit, or use fees. Party size, stock limits and length of stay requirements, etc. will meet general restrictions. The party will be counted within the applicable quota.

Non-allocated trips are trips for which the visitor obtains a wilderness permit from the Forest Service (for day or overnight use) and then arranges for guide service with a permitted outfitter/guide. Non-allocated outfitter/guide trips will be available on a space available basis. The permit will be issued for a group size that includes the guide. Any applicable reservation fee and/or permit fee will be paid by the user. Party size, stock limits and length of stay requirements, etc. will meet general restrictions. The party will be counted within the applicable quota

General Recreation Items

In heavily impacted areas, durable campsites will be identified and visitors will be encouraged to use these sites.

Recreational stock may be tied to trees over 8 inches DBH (diameter at breast height) for short periods for loading and unloading. Stock may not be tied to smaller trees for any length of time. The use of high lines, hobbles or portable fences is required for longer holding. Before leaving a site, equestrians are required to scatter manure at least 100 feet from water courses and campsites and fill in holes.

A moratorium on the placing of fixed (climbing) bolts within the wilderness is in effect until such time as the national policy is implemented.

Peak registers will be removed unless the register is covered by a Memorandum of Understanding which shows historical use, and which provides for protection of the wilderness resource.

3. Managerial Elements

Trails and Trailheads

All signing within the wilderness will be of natural oak or redwood. Letters will be routed and will not be painted. Signing at trail junctions will be on 6 inch by 6 inch redwood posts and will be directional only.

The Pacific Crest Trail will be maintained to National Scenic Trail standards.

Trails will be relocated away from wet meadow and riparian areas as much as possible. Trails that cannot be relocated will be re-engineered when damage becomes visible. If possible, engineered French drains will be used in order to facilitate groundwater flow.

Materials used in trail maintenance and reconstruction will be native materials if at all possible. Filter cloth may be used to correct drainage problems.

Information and Education

An information and education program will be developed to assist users in planning trips and making behavior choices that can result in reduced impacts to the wilderness resource. This program will emphasize written materials, displays at wilderness offices and trailheads, and off-forest presentations to train leaders of organizations and groups that use the wilderness. Forest staff will examine the feasibility of requiring wilderness visitors to view a video and pass a wilderness skills quiz yearly before obtaining wilderness permits.

The Desolation Wilderness Education Strategy will be used as guidance for targeting audiences and developing messages. Messages will increase public knowledge of wilderness resource issues such as air quality, the role of fire, ecosystem processes, and cultural resources. “Leave No Trace” messages will include information on trail use, campsite selection, sanitation, impacts of campfires, noise restrictions, and winter use.

Interpretation of wilderness resource components such as native plants, cultural resources, wildlife, etc. will be done outside of the wilderness. Interpretation of the wilderness resource will be sensitive to the fact that an important aspect of wilderness is the perceived "unknown".

E. ALTERNATIVE DESCRIPTIONS

ALTERNATIVE 1

Theme of the Alternative

In this alternative the anthropocentric philosophy of wilderness management is emphasized by addressing society's demands on wilderness rather than the natural condition of wilderness. The alternative emphasizes direct human use opportunities within the Desolation. Although wilderness permits and the overnight quota will be maintained, use will increase in this alternative through a relaxation of the overnight quota and continued increases in day use. There is a mix of three Opportunity Classes (OC 2, 3, and 4) provided in this alternative. The wilderness will be managed to meet the desired future conditions as described for each Opportunity Class in the section on Desired Future Conditions and the LAC process.

LRMP Consistency

In some cases, direction contained in this alternative is already included in forest wide standards and guidelines or in management area prescriptions for the Desolation Wilderness in the Eldorado and/or the Lake Tahoe Basin Management Unit LRMPs. In other cases, new direction is proposed which would result in changed standards and guidelines in one or both LRMPs. Implementing the new direction would require amendments to the Eldorado and Lake Tahoe Basin LRMPs.

Opportunity Class Allocations

Currently, the conditions in six management zones do not meet conditions appropriate for wilderness. In this alternative, these management zones will be managed to meet Opportunity Class 4 standards. To accommodate increased use, 16 management zones will be allowed to change to less primitive conditions than currently exist. Thirty-two zones will have an Opportunity Class 4 designation, 7 zones will be in Class 3, and 6 zones will be in Class 2. See the Alternative maps at the end of this chapter.

The Recreation Opportunity Spectrum (ROS) system defines six recreational opportunity classes that provide different settings for recreational use across the whole forest: from urban settings to primitive settings. The four Opportunity Classes developed for the Desolation all fall within the range of the two most primitive ROS classes, semi-primitive and primitive. In this alternative, approximately 50 percent of the Wilderness will be classified under the ROS system as semi-primitive, 50 percent as primitive.

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 0
Opportunity Class 2		= 31,729
Opportunity Class 3		= 13,980
Opportunity Class 4	(Least Primitive)	= 18,252

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

This alternative will provide for prescribed natural (lightning-caused) fire (PNF) after September 15 when both visitor use and fire danger are generally reduced. Only the most remote areas, those in Opportunity Class 2, will be managed for prescribed natural fires. These areas typically have no trails and little use. Lakes in these areas include Cliff Lake, Grouse Lakes (LTBMU), Lost Lake (ENF), Forni Lake, Secret Lake and the west side of Lake Aloha. Much of this area in the western portion of the Desolation is glacially scoured, high elevation, sparsely vegetated terrain. The northeast Opportunity Class 2 areas are typically more heavily forested.

2. RANGE

This alternative will amend grazing permits to include specific Indicator standards (see Desired Future Condition) which will guide range management. A monitoring plan will be developed for each allotment to assure that Indicator Standards are being met. Grazing permits will be adjusted as needed to meet Indicator Standards (see range of options in Appendix A). Other current allotment management strategies will continue as is detailed in Alternative 2.

Educational materials given to wilderness visitors will emphasize the role that grazing has played in the history of the Desolation and the surrounding area. At those times when cattle are in high use travel corridors within the wilderness, visitors will be notified of the presence of cattle in those areas.

3. WATER QUALITY

Based on increased visitation levels in this alternative, a need for back country toilets has been identified at the following lakes: Eagle Lake, Grouse Lake, Twin Lakes, Tamarack Lake, Lake Sylvia, Lake of the Woods, Avalanche Lake, Ropi Lake, Gilmore Lake, and Stony Ridge Lake. Site specific analysis will be conducted to determine the appropriate locations for back country toilets within these lake basins.

The 1975 Water Quality Monitoring Plan (Kuehn, 1975) will be updated and a monitoring schedule developed to provide increased monitoring of water quality in heavily used areas. The results will be used to determine the need for additional toilets or other restrictions.

See Issue 5, Visitor Impacts, for a discussion of other measures affecting water quality.

4. WOOD FIRES

Wood campfires will be allowed in all areas. At desirable campsites, fire rings will be maintained; all other fire rings will be removed. Campfires will be permitted only in established fire rings.

5. VISITOR IMPACTS

Camping will continue to occur in all zones. In lake basins and along stream courses with suitable topography, users will be required to camp at least 100 feet from water. Lakes and streams determined suitable for camping setbacks include Lake Aloha, Lake of the Woods, Avalanche, Ropi, Gilmore, Alta Morris, Stony Ridge, and the Velma Lakes. Where setbacks are not possible, site specific analysis will be completed to harden sensitive campsites where appropriate. Campsite hardening will be done by using natural materials to reduce both erosion potential and site expansion.

Campsites will be retained based on visibility, proximity to water, and resource considerations.

The number of recreational stock per group will not be limited. There will be no required setbacks from water, campsites or trails for stock.

6. QUOTAS AND GROUP SIZE

Throughout the Desolation, the maximum group size permitted will increase to 25 persons per group.

The overnight quota will continue between June 15 and Labor Day, however, the number of overnight users permitted each day will increase from 700 to 793 for the wilderness as a whole. The overnight quota will continue to be administered by trailhead; the increase in users permitted at each trailhead will be proportionate, based on campsite capacity in the area served by the trail. If the indicator standards in any particular area are exceeded, the trailhead quota serving that area will be adjusted accordingly. See Appendix E for an illustration of equivalent quota numbers for each alternative.

This alternative will not implement a day use quota as a means of maintaining Opportunity Class standards. Visitors will be redirected to less heavily used areas through education and other indirect management methods. Day use is expected to continue to increase.

Total use of the wilderness is expected to increase. Total use could exceed 1700 on a typical high use day.

Three equestrian guides, 2 winter guides, 2 guides providing day hikes, and 5 camps will offer services under permit. This alternative will allow an additional equestrian outfitter/guide to provide services in the northwest and Rockbound Valley portions of the Desolation. A winter guide will be permitted. Two permits for day hikes will be awarded. The day hike services will be required to be educational in nature and to teach participants about wilderness values. The allocated number of service days permitted per year for existing outfitter/guides will be set at 100 percent of their average use for the last 5 years.

The additional permits will be set at a maximum number of allocated service days comparable to those of the existing permittees.

The special use permits and annual operating plans for three organizational camps, Camp Sacramento, Berkeley Echo Camp, and Camp Concord will be amended to provide for off-site "guided" use within the Desolation. This historic "guided" use has occurred in the past 70 years with the knowledge of Forest Service staff; however, the use has not been covered under the permits for the camps. Inclusion of the guided use within the camp permits will administratively provide coverage of ancillary use. Stanford Camp, a private camp located near the wilderness boundary, has also included staff conducted trips into the wilderness in their camp program. A Special Use Permit will be issued to Stanford Camp to cover continued guided use.

Use of the Desolation by camps will be subject to general restrictions such as party size, stock limits, and length of stay restrictions, etc. Any wilderness permit or use fees will be paid by the camp. Camp use will be counted within any applicable quotas.

Guided Use Within the Desolation Wilderness Under Alternative 1

Outfitter/Guide or Camp Name	Allocated Service Days/Year	Unallocated Service Days/Year	Current 5 Year Avg of Service Days/Year
Existing Permits			
Camp Richardson	116	unlimited***	116
Cascade Stables	116	unlimited***	116
Deer Crossing Camp	80	0	80
Existing Use, New or Updated Permits			
Camp Sacramento	180	0	180
Berkeley Echo Camp	90	0	250
Camp Concord	10	0	10
Stanford Camp (private)	90	0	400
New Use, New Permits			

Equestrian Guide	116	unlimited***	0
Winter Guide	80	unlimited***	0
Winter Guide	80	unlimited***	0
Day Hike Guide	80	unlimited***	0
Day Hike Guide	80	unlimited***	0

*** Service days are limited by the number of available slots open under the quota at the time of application.

7. AIRCRAFT OVERFLIGHTS

The Forests will not recommend any changes to the existing 2000 foot AGL (above ground level) advisory. Wilderness staff will work with local airports and pilots associations to minimize violations.

8. DOGS

Staff will continue to educate the public about the El Dorado County ordinance which requires that dogs be leashed on public lands. Wilderness staff will use educational messages to encourage that dog owners comply with the county ordinance or leave dogs at home when traveling to the wilderness.

9. TRAILS

To provide more recreational opportunities, the current trail system will be expanded by adding non-system hiking routes to the existing trail system. Existing routes (such as the Willow Flat Trail and the unmaintained route from Forni Lake north through Tells Peak to the Rubicon Trail) which were removed from the Forest Service maintained system in 1978, will be returned to the system. A route from Lyons Creek to Pyramid Peak is also proposed. This will add 8 miles of trail to the present trail system.

Two trails (Eagle Lake Trail and McConnell Lake Trail) which are currently closed to stock use due to safety concerns will continue to be closed to stock use.

Major trails may be hardened through means such as the use of filter cloth and crushed granite to withstand heavy use.

To reduce encounters between groups, loop trails will be built in high use areas,. Such trails are proposed for the following areas: Grouse and Hemlock Lakes, Tamarack Lake, Maude Lake, and Lake Sylvia. A total of 7 miles of new trail is proposed in these areas.

The Van Vleck and Lyons Creek trailheads are targeted for upgrading. Upgrading will include paving of access roads and trailheads. Parking capacity will not be increased.

Additional trail junctions will be signed, including those on lesser used trails and in the more remote areas of the wilderness.

Unimproved trailheads will be upgraded. Trailhead improvements will be considered where needed to protect resources or improve health and safety, improve accessibility, or adjust capacity to accommodate use allowed by the quotas. Twin Lakes trailhead improvements will be completed, and analysis for construction of restrooms and relocation and/or adjustment to capacity of parking at the Twin Bridges trailhead will continue.

In all cases, before any trail construction or reconstruction is initiated, site specific analysis will be completed.

ALTERNATIVE 2 (NO ACTION/ CURRENT SITUATION)

Theme of the Alternative

This alternative continues the present management guidelines contained in the Land and Resource Management Plans (LRMPs) for both the Eldorado National Forest and the Lake Tahoe Basin Management Unit. The 1978 Desolation Wilderness Management Plan will continue to provide supplementary direction. Management direction varies in some cases between the two forest LRMPs.

LRMP Consistency

This alternative would not change direction for management of the Desolation Wilderness. The LRMPs for the Eldorado National Forest and the Lake Tahoe Basin Management Unit differ somewhat in direction provided for management of the Desolation. The direction provided in each LRMP would continue and no amendments to the LRMPs would be required.

Opportunity Class Allocations

The current direction does not provide for the designation of Opportunity Classes. The 1978 Desolation Wilderness Management Plan designated 13 travel zones which were designed to provide a method of tracking use. No indicators of social and resource conditions, or management actions were associated with the zone designations, and none will be established in this alternative.

The wilderness staff of the two Forests reviewed use and conditions in each of the new zone designations to make a determination as to what Opportunity Class each area most closely approximates. The corresponding acreages are given below.

Approximately 37 percent of the Desolation now meets the ROS definition of semi-primitive. Wilderness staff consider the heavily used lake basins (approximately 3 percent of the area) to be outside the range of conditions acceptable under the Wilderness Act due to crowding, and damage to vegetation and soils. Sixty-three percent of the area is in primitive, but not pristine condition. (A portion of the area which is in primitive condition currently gets a level of use which is consistent with a pristine designation, however large devegetated areas at a number of lakes keep the areas from being classified as pristine.)

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 0
Opportunity Class 2		= 40,409
Opportunity Class 3		= 8,485
Opportunity Class 4	(Least Primitive)	= 12,865
Area exceeding wilderness standards. (Class 5)		= 2,202

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

All fires will continue to be suppressed. Prescribed natural fires and management ignited prescribed fires will not be permitted.

The Eldorado LRMP directs the Forest to determine allowable fire size objectives for the Desolation and develop a Wilderness Fire Management Action Plan. Until the plan is completed, all fires are to be suppressed. Administrators are to use least cost suppression strategies to meet resource objectives, and to use "light hand on land" concepts in suppression efforts.

The Lake Tahoe Basin LRMP directs that the wildfire suppression strategy for high elevation alpine areas exhibiting non-continuous fuels and natural barriers (including the Desolation) is "confinement" of all fires at all fire intensity levels with a maximum size objective of 25 acres.

2. RANGE

The direction contained in the Eldorado LRMP is to "analyze and maintain allotments within the Desolation, where these allotments were established at the time of wilderness designation". Allotments are administered to achieve proper use, protection of resources, and coordination with dispersed recreation wilderness use. Readiness, utilization, ecological condition and trend surveys are to be performed according to regional methodologies. Grazing standards are established by the Eldorado National Forest LRMP. Existing and proposed range structural improvements are managed to meet Allotment Management Plan (AMP) and applicable wilderness area objectives.

There are no allotments on the LTBMU portion of the Desolation. Current allotment management will continue for those Eldorado allotments either partially or totally within the Desolation. Upon completion of environmental analysis and allotment management planning, new term grazing permits will be issued for allotments which become vacant, if continued grazing is determined to be appropriate.

3. WATER QUALITY

The current Eldorado LRMP direction for water quality is to rehabilitate areas where land disturbing activities such as improper grazing, recreation trails, and campsite overuse have caused resource damage, if natural recovery will take longer than 10 years. Where beneficial uses of water are adversely affected due to man's activities or natural disasters such as fire and flood, stream channels and slopes will be stabilized, using reasonable non-mechanized and inconspicuous methods designed to become unnoticeable to the casual observer within 5 years.

The LTBMU and Eldorado LRMPs, through the 1978 Desolation Plan, direct that toilets may only be installed to meet water quality standards if the only alternative is elimination of recreation use. Recreation use, however, must be limited to the capacity of the area. The LRMP, in general forest direction, provides for the management of naturally functioning stream environment zones in their natural hydrologic condition.

The current educational messages which recommend camping in already impacted sites at least 100 feet from water, using cat-holes at least 100 feet from water, and packing out or burying toilet paper will be continued. Water quality monitoring identified in the 1975 Desolation Water Quality Monitoring Plan (Kuehn, 1975) will be continued as funding allows.

4. WOOD FIRES

The special order prohibiting wood campfires in all areas of the Wilderness will continue. Fully enclosed wood camp stoves (with chimneys having spark arresters) will be permitted.

5. VISITOR IMPACTS

The Eldorado and the Lake Tahoe Basin LRMPs give direction to provide for very low interaction between visitors in order to provide for the availability of solitude. The Eldorado LRMP directs that its wilderness lands, including the Desolation, be managed to a Recreational Opportunity Spectrum of Primitive. The Lake Tahoe Basin LRMP notes that none of its acres within the Desolation meet the criteria for primitive due to high use. They are given a rating of semi-primitive.

The 1978 Desolation Wilderness Management Plan directs that camping use be regulated where over-use is contributing to insect attacks. No specific problem areas have been identified. Camping is to be discouraged within 100 feet of any lake or stream.

The current management of visitors will continue. Camping will occur in all zones; camping within 100 feet of water will be discouraged through education.

There will be no limits on the size of stock groups. Stock regulations to prevent damage to vegetation and soils will be considered as directed in the existing Desolation Plan. Possible regulations to be considered in the future will include restrictions on tying stock close to water, campsites and trails.

6. QUOTAS AND GROUP SIZE

Both the Eldorado LRMP and the Lake Tahoe Basin LRMP (through its reference to the 1978 Desolation Wilderness Management Plan) give direction to manage the wilderness to preserve unique wilderness characteristics and to limit use to the social carrying capacity. The permit system is used to limit use through the application of trailhead quotas on overnight use.

In this alternative, the maximum group size of 15 will continue under the joint Forest Order between the Lake Tahoe Basin and the Eldorado. The trailhead quota of 700 overnight users each day will continue between June 15 and Labor Day. There will be no day use quota; day use will be expected to increase.

In 1993, approximately 400 overnight users and 970 day users entered the Desolation on a typical high use day, however total use approached 2300 on several heavy use days.

The Lake Tahoe Basin LRMP directs that no new commercial use be permitted within the Desolation. The Eldorado LRMP directs that commercially permitted use is only to be

allowed if it does not compromise the wilderness resource and character, if such use fulfills a specific public need and cannot be provided in non-wilderness areas (is wilderness dependent).

Two equestrian guides (Camp Richardson and Cascade Stables) and 1 camp (Deer Crossing Camp will offer services under permit.

Use of the Desolation by camps will be subject to general restrictions such as party size, stock limits, and length of stay restrictions, etc. Any wilderness permit or use fees will be paid by the camp. The use will be counted within any applicable quotas.

Guided Use Within the Desolation Wilderness Under Alternative 2

Outfitter/Guide or Camp Name	Allocated Service Days/Year*	Unallocated Service Days/Year**	Current 5 Year Avg of Service Days/Year
Camp Richardson	unlimited	N/A	116
Cascade Stables	unlimited	N/A	116
Deer Crossing Camp	unlimited	N/A	80

*These service days are being shown under allocated days because the permittees write their own permits which are not included in quota ceilings.
**The current camp use is included in this category since camp staff obtain their wilderness permits through the same permit system as the general public.

7. AIRCRAFT OVER-FLIGHTS

The 1978 Desolation Wilderness Management Plan direction is to work with the Federal Aviation Administration (FAA) and military to establish minimum flight altitudes over Desolation Wilderness. There is no current effort to establish such minimum altitudes.

The existing 2000 foot AGL (above ground level) advisory will be maintained. The Forests will emphasize educational programs for local airports and pilots groups.

8. DOGS

Staff will continue to educate the public about the El Dorado County ordinance which requires that dogs be leashed on public lands. Wilderness staff will use educational messages to encourage that dog owners comply with the county ordinance or leave dogs at home when traveling to the wilderness.

9. TRAILS

The current trail system will be maintained to experience levels and management prescriptions identified in the ROS system. Two trails (Eagle Lake Trail and McConnell Lake Trail) which are currently closed to stock use due to safety concerns will continue to be closed to stock use.

Wilderness trails on the Eldorado are currently maintained to one of the following standards:

Difficult

Maintained for primitive experience. No tread maintenance. Drainage is functional and not likely to fail. Trail sides are not brushed, but tread kept passable. Tread may be rough, but provisions are made for resource protection and user safety. Intended for foot and stock traffic. Expected use level is less than 30 users annually. Condition surveys and maintenance performed every 3-5 years.

Moderate

Maintained for near primitive experience. Tread maintained for user safety, resource protection and investment protection. Drainage performance is the same as "difficult". Limited brushing, slide removal and drainage maintenance. Logs or similar rustic structures may be used at stream crossings. Intended for foot and stock traffic. Expected use level is 30 - 600 users annually. Condition surveys and maintenance performed every 2-3 years.

Easy

Maintained for intermediate level experience. Tread maintained for public safety and user convenience. The drainage specifications are the same as "difficult". Trail sides brushed out to standards in the Trails Management Handbook (FSH 2309.18). Tread surface is relatively smooth. Intended for foot, horse and cross-country skiing. Expected use level is 600 plus users annually. Condition surveys and maintenance performed every 1-2 years. Logged out annually. Tread and backslopes groomed, rocks removed, structures maintained.

Trails on the LTBMU are currently maintained in accordance with intended management objectives for the individual segments (as identified in the LTBMU Trail Inventory). Within the Desolation Wilderness, trails are either designated for hikers as the primary user group and pack and saddle stock users as a secondary activity, or they are designated for hikers only.

Maintenance standards for both designations on the LTBMU are the same. Trails are maintained to assure proper drainage, and functional water bars and diversion ditches. Clearing widths, obstacle removal, and tread maintenance are performed to meet guidelines in the Trails Management Handbook (FSH 2309.18). Small diameter trees and obstacles may be allowed either across or adjacent to trailways. Special maintenance attention is given to eliminating switchbacks, and eliminating high risk hazard trees as needed from heavily used travelways and near trailheads. Signs are appropriate to the wilderness setting. Annual maintenance is conducted.

No new trailheads are planned on either the Eldorado or the LTBMU. Plans to move and upgrade the Twin Lakes Trailhead to improve problems in the Wrights Lake area will continue. Restrooms and relocation and/or reduction of parking at the Twin Bridges Trailhead is currently being considered in a separate Environmental Assessment.

Current trail signs will be maintained. Wilderness boundary signs are built to national standards. Signs in the interior of the Wilderness, consisting of 6 inch by 6 inch posts, will replace existing signs as needed.

ALTERNATIVE 3

Theme of the Alternative

This alternative includes several measures which will enhance the quality of the visitor's primitive recreation experience. The emphasis is on providing social and experiential conditions that can give the user a greater sense of solitude and to reduce conflicts that take away from a primitive recreation experience. The number of day users is lowered slightly through application of a day use quota in popular areas; however, there are fewer use restrictions and use limits than proposed in Alternatives 4, 5, and 6 which each emphasize protection of natural biophysical conditions to a greater degree.

LRMP Consistency

In some cases, direction contained in this alternative is already included in forest wide standards and guidelines or in management area prescriptions for the Desolation Wilderness in the Eldorado and/or the Lake Tahoe Basin Management Unit LRMPs. In other cases, new direction is proposed which would result in changed standards and guidelines in one or both LRMPs. Implementing the new direction would require amendments to the Eldorado and Lake Tahoe Basin LRMPs.

Opportunity Class Allocations

This alternative provides a mix of the four Opportunity Classes. Most lake basins which have received heavy use will be restored to more primitive conditions. The objective of this alternative, as a whole, is to return all areas of the wilderness to more pristine conditions than currently exist.

Management actions will be implemented to improve the conditions in the 6 management zones which currently do not meet wilderness standards (zones 1, 18, 36, 40, 41, and 44). They will be managed for Opportunity Class 4 conditions. These are the small heavily used lake basins with easy access. In addition, 14 management zones (zones 3, 7, 16, 17, 23, 25, 28, 29, 32, 33, 34, 39, 42, and 43) in which current conditions approximate those found in Opportunity Class 4 areas, will be managed to achieve the desired conditions for Opportunity Class 3.

Of those zones which currently approximate Opportunity Class 3 conditions, seven (6, 11, 13, 22, 31, 37, and 45,) will be changed to Opportunity Class 2 conditions. Four zones (2, 5, 15, and 27) which currently meet Opportunity Class 2 descriptions (due primarily to physical signs of past use) will be managed for pristine conditions as Opportunity Class 1 areas.

In this alternative approximately 26 percent of the area is semi-primitive, 74 percent is primitive.

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 23,738
Opportunity Class 2		= 23,796
Opportunity Class 3		= 13,150
Opportunity Class 4	(Least Primitive)	= 3,277

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

A Wilderness Prescribed Fire Strategy will be developed that provides for prescribed fire (planned and natural) throughout the wilderness except in areas where expected fire behavior is an unacceptable threat to visitor safety, or where fire behavior predictions indicate that wildfire will escape the wilderness. In such areas, fire will be suppressed using "Confine, Contain, Control" strategies.

Areas where prescribed fire will be discouraged during the high use season include wooded Opportunity Class 3 and 4 areas such as Grouse Lake, Lyons Creek, Tamarack Lake, Grass Lake, Cathedral Lake, Bayview, Eagle Lake, and Crag Lake. In addition, heavily wooded slopes with continuous fuels which extend beyond the wilderness to populated areas will not be managed for prescribed fire. Such areas include the red fir and mixed red fir forests on the external slopes of the Desolation. Precise fire management boundaries will be described in the Wilderness Prescribed Fire Strategy to be prepared upon completion of the LRMP amendment.

2. RANGE

This alternative will amend grazing permits to include specific Indicator standards (see Desired Future Condition) which will guide range management. A monitoring plan will be developed for each allotment to assure that Indicator standards are being met. Grazing permits will be adjusted as needed to meet Indicator Standards (see range of options in Appendix A).

Grazing permits will include herding strategies to reduce conflicts between recreation use and grazing in areas with high recreation use. Cattle in the Wrights Lake Allotment will not be herded into the Maude Lake, Gertrude Lake, or Tyler Lake Basins. The permittee would continue to avoid herding cattle into the Sylvia, Lyons, Twin, and Grouse Lakes areas; however, they do currently drift into the Sylvia and Lyons Lake areas and may drift into the other lakes. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin. If the Rockbound Allotment is filled, cattle will not be herded into Camper Flat and China Flat areas along the Rubicon River, Lake Schmidel, Lois Lake, and Upper and Lower Doris Lakes. If they do drift into some of these areas in the Rockbound Allotment, a herding strategy will be implemented to keep them out.

The use of cowbells will be eliminated in wilderness portions of Allotments.

3. WATER QUALITY

This alternative establishes a mandatory setback of 200 feet from water, campsites and trails for the disposal of human waste (feces). A Forest order will stipulate that toilet paper be buried or carried out. Use of cat-holes for human waste will be recommended. The 1975 Water Quality Monitoring Plan (Kuehn, 1975) will be updated and a monitoring schedule developed for heavily used areas to ensure water quality standards are being met.

4. WOOD FIRES

"No Trace" wood campfires will be permitted only in designated areas in Opportunity Classes 1 and 2. Those areas designated for wood campfires will be located in zones 2, 4, 5, 8, 10, 11, and 12.

No campfires will be permitted in Opportunity Classes 3 and 4.

5. VISITOR IMPACTS

Although no camping setbacks from water will be required, educational materials will recommend that visitors camp 100' from water, trails, and other campsites, where possible. Individual campsites will be closed based on their visibility, proximity to water, and wilderness resource considerations. Specific areas will be closed to camping to provide for day use while improving resource conditions. The following locations will be closed to overnight camping: Grouse Lake, Avalanche Lake, Tamarack, Cagwin, Ralston, and Eagle Lake.

Stock use will be limited to 2 stock per person with a limit of ten per party in Opportunity Classes 1 and 2, and a limit of 15 per party in Opportunity Classes 3 and 4. Regulations will prohibit the tying of stock within 200 feet of water and 100 feet of campsites and trails.

6. QUOTAS AND GROUP SIZE

The maximum group size will be 15 in Classes 3 and 4, and 6 in Classes 1 & 2. The overnight quota will be administered by zone in Classes 1 and 2. In Opportunity Classes 3 and 4, the quota will be administered by specific lakes. Use at some lakes will decrease and use at other lakes might increase, in effect dispersing use within the more heavily used zones.

To meet Opportunity Class standards, the overnight quota will decrease initially from 700 persons per day to 582 per day for the wilderness as a whole. However, the number of persons permitted to enter on a specific trail will increase in a number of cases. The quota for each area will be adjusted as needed to meet social and resource standards. The initial quota is based on the number of campsites at each lake which are believed to meet resource and social conditions. In areas where quotas are not effective in reducing resource damage, campsites will be designated. The quota dates will be extended to May 1 through September 30 in order to reduce peak use during the early and late summer months.

A trailhead quota for day use will be implemented for trails leading into Class 4 areas, and then in other areas as needed to maintain desired conditions for those areas. (See Appendix E)

Outfitter/guides

Two equestrian guides, 2 winter guides and 5 camps will offer services under permit.

The special use permits and annual operating plans for three organizational camps, Camp Sacramento, Berkeley Echo Camp, and Camp Concord will be amended to provide for off site "guided" use within the Desolation. This historic "guided" use has occurred in the past 70 years with the knowledge of Forest Service staff; however, the use has not been covered under the permit for the camps. Inclusion of the guided use within the camp permits will administratively provide coverage of ancillary use. Stanford Camp, a private camp located near the wilderness boundary, has also included staff conducted trips into the wilderness in their camp program. A Special Use Permit will be issued to Stanford Camp to cover this use.

Use of the Desolation by camps will be subject to general restrictions such as party size, stock limits, and length of stay restrictions, etc. Any wilderness permit or use fees will be paid by the camp. The use will be counted within any applicable quotas.

Guided use will be regulated by zone. In Opportunity Classes 3 and 4. the number of allocated service days permitted per year for existing outfitter/guides will be set at 100 percent of their average use for the last 5 years. The additional permits will be set at a maximum number of allocated service days comparable to those of the existing permittees. In Opportunity Classes 1and 2, allocated service days will be set at 80 percent of the average use for the last 5 years.

An additional 250 service days will be made available, by lottery, to applicants who wish to apply for one trip meeting the definition of a guided trip - (see the "Direction Common to All Alternatives" section). Each applicant may request up to 50 service days.

Guided Use Within the Desolation Wilderness Under Alternative 3

Outfitter/Guide or Camp Name	Allocated Service Days/Year	Unallocated Service Days/Year	Current 5 Year Avg of Service Days/Year
Existing Special Use Permits			
Camp Richardson	109 (OC 3 & 4) 6 (OC 1 & 2)	unlimited***	116
Cascade Stables	109 (OC 3 & 4) 6 (OC 1 & 2)	unlimited***	116
Deer Crossing Camp	20 (OC 3 & 4) 48 (OC 1 & 2)	0	80
Existing Use, New or Updated Special Use Permits			
Camp Sacramento	180 (OC 3 & 4)	0	180
Berkley Echo Camp	90 (OC 3 & 4)	0	250
Camp Concord	10 (OC 4)	0	10
Stanford Camp	72 (OC 3 & 4)	0	400
New Use, New Permits			
Winter Guide	64	unlimited***	0
Winter Guide	64	unlimited***	0
Individual Trips By Lottery	250	0	0

*** Service days are limited by the number of available slots open under the quota at the time of application.

7. AIRCRAFT OVER-FLIGHTS

A 2000 foot AGL (above ground level) mandatory minimum altitude over the Desolation will be recommended to the FAA. The FAA, based on the Forests' recommendation, will then conduct its own scoping and analysis.

8. DOGS

Dogs will be required to be on leashes in all areas of the Desolation.

9. TRAILS

No new trails will be added to the trail system within the wilderness. Areas adjacent to, but outside wilderness will be targeted for additional trails to relieve pressure on the wilderness. Locations targeted for additional use of existing trails or development of new non-wilderness trails include the newly reconstructed Two Peaks Trail and other established trails in the Van Vleck area; several loop trails in the Wrights Lake area; the Windmiller trail; and non-wilderness loop trails at Pyramid Canyon, the Echo Lakes area, Lily Lake, Bloodsucker Lake, and Eagle Falls. Trailhead access and signing will be improved at non-wilderness trailheads to encourage their use.

Trails will be re-routed to avoid areas with sensitive biophysical or cultural resources. The McConnell Lake Trail from Camper Flat to Lake Zitella, and the trail to Tyler Lake from Gertrude Lake will no longer be maintained and will not be shown on maps.

The Eagle Lake Trail, which is currently closed to stock use due to safety concerns, will continue to be closed to stock use.

If the day use quota is not effective in reducing use, removal of the Eagle Falls bridge is proposed.

Directional signing will be provided only at designated major trail junctions. Signs will be provided at all Pacific Crest Trail (PCT) junctions. Additional signs will be located at three trail junctions along the Rubicon Trail, the Grouse and Twin Lakes Trail junction, and the Bayview and Eagle Falls Trail junction.

No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if needed to protect resources or improve health and safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Twin Lakes trailhead improvements will be completed, and restrooms and relocation and/or reduction of parking at Twin Bridges trailhead will be considered.

In all cases, before any trail construction or reconstruction is initiated, site specific analysis will be completed.

ALTERNATIVE 4

Theme of the Alternative

Several measures which will emphasize physical restoration are proposed in this alternative. More consideration is given to protecting the biophysical components of the Desolation. More emphasis is given to returning to natural ecosystem conditions through more widespread use of prescribed fire, lower group sizes, and lower visitor use. This alternative provides a mix of all four Opportunity Classes with more Classes 1 and 2 areas than Alternative 3.

LRMP Consistency

In some cases, direction contained in this alternative is already included in forest wide standards and guidelines or in management area prescriptions for the Desolation Wilderness in the Eldorado and/or the Lake Tahoe Basin Management Unit LRMPs. In other cases, new direction is proposed which would result in changed standards and guidelines in one or both LRMPs. Implementing the new direction would require amendments to the Eldorado and Lake Tahoe Basin LRMPs.

Opportunity Class Allocations

Three zones, 18, 41 and 44, will be managed for Class 4 conditions. Sixteen areas will be managed for Class 3 standards; eighteen areas will be managed to Class 2 standards and eight mostly trailless areas will be managed for desired pristine conditions.

Twenty percent of the Desolation will be semi-primitive, while 80 percent of the area will receive a primitive ROS rating.

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 38,240
Opportunity Class 2		= 12,941
Opportunity Class 3		= 12,122
Opportunity Class 4	(Least Primitive)	= 657

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

Prescribed natural and planned ignition fire will be permitted in all areas of the wilderness, returning fire to its natural role in the ecosystem. Consideration will be given to public safety.

A Fire Management Action Plan will be developed to accomplish the proposed direction. Lands within the Desolation will be divided into conditional fire management zones which will allow a conditional response to fire, depending on the time of year, elevation, and burning conditions, etc. Maximum allowable fire size for each zone will be derived from

prevalent vegetation types, topography, public safety concerns, and risk of fire escape from the wilderness. Accidental human-caused fires will be suppressed using confine, contain and control strategies.

2. RANGE

This alternative will amend grazing permits to include specific Indicator standards (see Desired Future Condition) which will guide range management. A monitoring plan will be developed for each allotment to assure that Indicator standards are being met. Grazing permits will be adjusted as needed to meet Indicator Standards (see range of options in Appendix A). Other current allotment management strategies will continue as is detailed in Alternative 2.

Grazing permits will include herding strategies for years with low precipitation amounts. At these times the cattle tend to concentrate around lakes as the water recedes, creating a higher potential for conflicts between recreation use and grazing. Cattle in the Wrights Lake Allotment will not be herded into the Maude Lake, Gertrude Lake, or Tyler Lake Basins during low precipitation years. The permittee would continue to avoid herding cattle into Sylvia, Lyons, Twin, and Grouse Lakes areas; however they do currently drift into the Sylvia and Lyons Lake areas and may drift into the other lakes. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin.

The Rockbound Allotment, which has been vacant since 1988, would be closed.

3. WATER QUALITY

As in Alternative 3, this alternative establishes a mandatory setback of 200 feet from water, campsites and trails for the disposal of human waste (feces). A Forest order will stipulate that toilet paper be buried or carried out. Use of cat-holes for human waste will be recommended. The 1975 Water Quality Monitoring Plan (Kuehn, 1975) will be updated and a monitoring schedule developed for heavily used areas to ensure water quality standards are being met.

4. WOOD FIRES

Wood campfires will continue to be prohibited in all areas of the Desolation. Fully enclosed camp stoves with chimneys having spark arresters will be permitted.

5. VISITOR IMPACTS

As in Alternative 3, camping will be prohibited at Grouse Lake, Avalanche Lake, Tamarack, Ralston and Cagwin Lakes, and Eagle Lake to provide day use opportunities and to rehabilitate portal areas. Individual campsites will be removed based on both biophysical and social factors. In riparian areas, campsites slated for removal will be re-vegetated as needed.

Campsites will be designated at the following heavily used lakes: Crag, Gilmore, Susie, Lake of the Woods, Pitt, Sylvia, and Maude. Campers will have their choice of designated sites for camping.

Stock use restrictions will be the same as those in Alternative 3 except that the maximum number of stock permitted per user group will be lowered to 8 in Opportunity Classes 1 and 2, and 12 in Classes 3 and 4.

6. QUOTAS AND GROUP SIZE

The maximum group size will be 12 persons in Opportunity Classes 3 and 4, and 6 persons in Classes 1 and 2.

The quota will be in effect from May 1 through September 30 (the same as Alternative 3). The overnight quota will initially be reduced to 495 persons from 700 persons per day, a reduction that will help meet solitude objectives for the area. It will be administered as provided in Alternative 3.

A trailhead quota for day use will be implemented at all trailheads. A maximum of 211 day use permits will be issued each day for the wilderness. (Refer to the Day Use and Overnight Quota chart in Appendix A.) Quota numbers will be changed as needed to maintain Opportunity Class standards.

Outfitter/guides

The two equestrian guides and 5 camps permitted to operate within the Desolation will do so at a use level proportionate to the overall changes in quota numbers. Use, including day use, will be allocated by zone.

The special use permits and annual operating plans for three organizational camps, Camp Sacramento, Berkeley Echo Camp and Camp Concord will be amended to provide for off-site "guided" use within the Desolation. This historic "guided" use has occurred in the past 70 years with the knowledge of Forest Service staff; however, the use has not been covered under the permit for the camps. Inclusion of the guided use within the camp permits will administratively provide coverage of ancillary use. Stanford Camp, a private camp located near the wilderness boundary, has also included staff conducted trips into the wilderness in their camp program. A Special Use Permit will be issued to Stanford Camp to cover this use.

Use of the Desolation by camps will be subject to general restrictions such as party size, stock limits, and length of stay restrictions, etc. Any wilderness permit or use fees will be paid by the camp. Permitted use by the camps will occur at a level proportionate to the change in quota numbers and will be counted within any applicable quota. Use will be regulated by zone.

Guided Use Within the Desolation Wilderness Under Alternative 4

Outfitter/Guide or Camp Name	Allocated Service Days/Year	Unallocated Service Days/Year	Current 5 Year Avg of Service Days/Year
Existing Special Use Permits			
Camp Richardson	66	unlimited***	116
Cascade Stables	66	unlimited***	116
Deer Crossing Camp	46	0	80
Existing Use, New or Updated Special Use Permits			
Camp Sacramento	120	0	180
Berkeley Echo Camp	60	0	250
Camp Concord	10	0	10
Stanford Camp (private)	60	0	400

*** Service days are limited by the number of available slots open under the quota at the time of application.

7. AIRCRAFT OVER-FLIGHTS

The direction for addressing aircraft over-flights will be the same as in Alternative 3.

8. DOGS

Dogs will be permitted on a leash in all areas of the wilderness.

9. TRAILS

Trail construction, management, and maintenance will be the same as in Alternative 3.

As in Alternative 3, removal of the Eagle Falls bridge is proposed if the day use quota is not effective in reducing use.

As in Alternative 3, directional signing will be provided at designated major trail intersections.

Where feasible and practical, trailhead parking capacity will be adjusted up or down to accommodate trailhead quotas. No new wilderness trailheads will be built. Facilities at existing trailheads may be modified or relocated if needed to protect resources or improve health and safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Twin Lakes Trailhead improvements will be completed,

and restrooms and relocation and/or reduction of parking at Twin Bridges trailhead will be considered.

In all cases, before any trail construction, reconstruction or physical removal is initiated, site specific analysis will be completed.

ALTERNATIVE 5

Theme of the Alternative

Ecosystem recovery is emphasized in this alternative, while the amount of visitor use is lowered. The alternative contains measures which allow for return to natural ecosystem conditions through broader management of visitor use and additional considerations for natural fire.

LRMP Consistency

In some cases, direction contained in this alternative is already included in forest wide standards and guidelines or in management area prescriptions for the Desolation Wilderness in the Eldorado and/or the Lake Tahoe Basin Management Unit LRMPs. In other cases, new direction is proposed which would result in changed standards and guidelines in one or both LRMPs. Implementing the new direction would require amendments to the Eldorado and Lake Tahoe Basin LRMPs.

Opportunity Class Allocations

This alternative provides a mix of Opportunity Classes 1 through 3. Eleven zones are managed to achieve Class 3 conditions, 23 zones are managed for Class 2 conditions, and 11 are managed to achieve Class 1 conditions. (Class 1 acreage increases slightly compared to Alternative 4, while Class 2 acreage increases substantially and Class 3 acreage is reduced.)

Ten percent of the area is managed to semi-primitive standards; ninety percent to primitive standards.

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 41,464
Opportunity Class 2		= 16,087
Opportunity Class 3		= 6,410
Opportunity Class 4	(Least Primitive)	= 0

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

As in Alternative 4, this alternative provides for prescribed fire (planned and natural) in all areas of the wilderness.

2. RANGE

This alternative will amend grazing permits to include specific Indicator Standards (see Desired Future Condition) which will guide range management. A monitoring plan will be developed for each allotment to assure that Indicator standards are being met. Grazing

Permits will be adjusted as needed to meet Indicator Standards (see range of options in Appendix A). Other current allotment management strategies will continue as is detailed in Alternative 2.

Grazing permits will include herding strategies for years with low precipitation amounts. At these times the cattle tend to concentrate around lakes as the water recedes, creating a higher potential for conflicts between recreation use and grazing. Cattle in the Wrights Lake Allotment will not be herded into the Maude Lake, Gertrude Lake, or Tyler Lake Basins during low precipitation years. The permittee will continue to avoid herding cattle into Sylvia, Lyons, Twin, and Grouse Lakes areas; however they do currently drift into the Sylvia and Lyons Lake areas and may drift into the other lakes. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin.

The Rockbound Allotment, which has been vacant since 1988, would be closed.

3. WATER QUALITY

As in Alternative 3, this alternative establishes a mandatory setback of 200 feet from water, campsites and trails for the disposal of human waste (feces). A Forest order will stipulate that toilet paper be buried or carried out. Use of cat-holes for human waste will be recommended. The 1975 Water Quality Monitoring Plan (Kuehn, 1975) will be updated and a monitoring schedule developed for heavily used areas to ensure water quality standards are being met.

4. WOOD FIRES

As in Alternative 4, wood campfires will be prohibited. Fully enclosed camp stoves with chimneys having spark arresters will be permitted.

5. VISITOR IMPACTS

Camping direction will be the same as in Alternative 4, however, the total number of stock allowed per group will be lowered.

Two recreational stock will be permitted per person, with a maximum of 6 stock per party in Opportunity Classes 1 and 2, and a maximum of 10 per party in Classes 3 and 4.

Recreational stock use will be permitted in specific areas. Zones through which the PCT, Rockbound, Rubicon, Red Peak, Red Peak Stock, Tahoe-Yosemite, Bayview and Glen Alpine trails pass, will be designated for stock use.

In addition to implementing those actions common to all action alternatives, stock regulations requiring that stock be tied at least 200 feet from water and 100 feet from trails and campsites will be implemented. In addition, stock users will be required to carry supplemental feed. The advantages of weed-free feed will be examined. Such feed will be a future requirement if resource conditions warrant its use.

6. QUOTAS AND GROUP SIZE

The maximum group size will be 12 in Opportunity Class 3, and 6 in Classes 1 and 2.

The quota dates will be the same as in Alternative 3.

Elimination of campsites to achieve more natural conditions along lake shores will result in a reduction in the overnight quota to 402 persons per day. This number will be preliminary and will be adjusted if Opportunity Class standards are exceeded.

A day use quota of 165 permits per day will be implemented at all trailheads. It will be adjusted as needed to maintained desired social and physical conditions.

Outfitter/guides

The two equestrian guides and one camp permitted to operate within the Desolation will do so at a use level proportionate to the overall changes in quota numbers. Use, including day use, will be allocated by zone. Outfitter/guides will be required to provide educational materials and information to their clients.

Camp Sacramento, Berkeley Echo Camp, and Camp Concord will not receive updated permits for guided use within the Desolation, and a new permit will not be issued to Stanford Camp to cover such use. Camp participants may obtain their own permits to hike, without a guide, within the Desolation. Forest staff will work with camp staff to provide non-wilderness locations for staff guided hikes.

Guided Use Within the Desolation Wilderness Under Alternative 5

Outfitter/Guide or Camp Name	Allocated Service Days/Year	Unallocated Service Days/Year	Current 5 Year Avg of Service Days/Year
Camp Richardson	66	unlimited***	116
Cascade Stables	66	unlimited***	116
Deer Crossing Camp	46	0	80

*** Service days are limited by the number of available slots open under the quota at the time of application.

7. AIRCRAFT OVER-FLIGHTS

As in Alternative 3, a minimum ceiling of 2000 feet will be recommended to the FAA.

8. DOGS

As in Alternative 3, dogs will be permitted on leash within all areas of the wilderness.

9. TRAILS

No new trails will be added to the system. Areas adjacent to wilderness will be targeted for new trails. Trails in Opportunity Classes 1 and 2 will be considered for removal and site rehabilitation where possible. The PCT will continue to receive full maintenance. Other trails will be maintained for resource protection only, and will be re-routed as needed in sensitive areas.

As in Alternatives 3 and 4, removal of the Eagle Falls bridge is proposed if the day use quota is not effective in reducing use.

As in Alternatives 3 and 4, directional signing will be provided at designated major trail intersections.

Where feasible and practical, trailhead parking capacity will be adjusted up or down to accommodate trailhead quotas. No new wilderness trail heads will be built. Facilities at existing trail heads may be modified or relocated if needed to protect resources or improve health and safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Twin Lakes Trailhead improvements will be completed, and restrooms and relocation and/or reduction of parking at Twin Bridges Trailhead will be considered. As in Alternative 3, removal of the Eagle Falls bridge is proposed if the day use quota is not effective in reducing use.

In all cases, before any trail construction, reconstruction or physical removal is initiated, site specific analysis will be completed.

ALTERNATIVE 6

Theme of the Alternative

This alternative provides the most biocentric approach to resolution of the issues; it places the most emphasis on preservation of the natural order. The human benefits derived from wilderness under this alternative will be dependent on the naturalness of the wilderness ecosystem. In order to return the Desolation to natural conditions, stringent controls will be placed on human influences. Visitor use levels will drop dramatically. Campsite areas at lakes will be restored to achieve more natural conditions. Grazing may decrease over time, and natural ignition prescribed fire will occur.

This alternative allows only the two most pristine Opportunity Classes, Classes 1 and 2.

LRMP Consistency

In some cases, direction contained in this alternative is already included in forest wide standards and guidelines or in management area prescriptions for the Desolation Wilderness in the Eldorado and/or the Lake Tahoe Basin Management Unit LRMPs. In other cases, new direction is proposed which would result in changed standards and guidelines in one or both LRMPs. Implementing the new direction would require amendments to the Eldorado and Lake Tahoe Basin LRMPs.

Opportunity Class Allocations

The heavily used lake basins close to the wilderness boundary are managed to provide Opportunity Class 2 conditions. All other areas are managed as Class 1 areas to provide the few users with pristine conditions. All areas are rated as primitive on the Recreation Opportunity Spectrum.

Acres by Opportunity Class

Opportunity Class 1	(Most Primitive)	= 55,722
Opportunity Class 2		= 8,239
Opportunity Class 3		= 0
Opportunity Class 4	(Least Primitive)	= 0

Wilderness Program Direction if this Alternative were Implemented

1. FIRE

Natural prescribed fire will be allowed in all areas of the Desolation, thereby returning fire to its natural role in the ecosystem. Management ignited prescribed fire will not be a management option under this alternative. Consideration will be given to public safety.

2. RANGE

This alternative will amend grazing permits to include specific Indicator Standards (see Desired Future Condition) which will guide range management. A monitoring plan will be developed for each allotment to assure that Indicator Standards are being met. Grazing permits will be adjusted as needed to meet Indicator Standards (see range of options in Appendix A). If Desired Future Conditions are not being met in wilderness portions of the Allotment after five years of monitoring, and the trend is stable to downward, then those portions of the allotment will be rested. Other current allotment management strategies will continue as is detailed in Alternative 2.

Grazing permits will include herding strategies for years with low precipitation amounts. At these times the cattle tend to concentrate around lakes as the water recedes, creating a higher potential for conflicts between recreation use and grazing. Cattle in the Wrights Lake Allotment will not be herded into the Maude Lake, Gertrude Lake, or Tyler Lake Basins during low precipitation years. The permittee would continue to avoid herding cattle into Sylvia, Lyons, Twin, and Grouse Lakes areas; however they do currently drift into the Sylvia and Lyons Lake areas and may drift into the other lakes. If the Pearl Lake Allotment is filled, cattle will not be herded into Lawrence Lake Basin.

The Rockbound Allotment, which has been vacant since 1988, would be closed.

3. WATER QUALITY

Wilderness visitors will be required to pack out their human waste (feces) and toilet paper in all areas of the Wilderness. The 1975 Water Quality Monitoring Plan (Kuehn, 1975) will be updated and a monitoring schedule developed for heavily used areas to ensure water quality standards are being met.

4. WOOD FIRES

As in Alternative 4, wood campfires will continue to be prohibited in all areas of the Desolation. Fully enclosed camp stoves with chimneys having spark arresters will be permitted.

5. VISITOR IMPACTS

As in Alternative 3, camping will be prohibited at Grouse Lake, Avalanche Lake, Tamarack, Ralston and Cagwin Lakes, and Eagle Lake, to provide day use opportunities and to rehabilitate portal areas. Individual campsites will be removed based on both biophysical and social factors, however more campsites will be removed and rehabilitated to provide more pristine conditions and solitude for those visitors entering the wilderness.

In riparian areas, campsites slated for removal will be re-vegetated as needed.

Recreational stock will be permitted in the Desolation for day trips only. The number of stock permitted will be 2 per person, with a maximum limit of 6 per group. As in Alternative 3, setbacks from water, campsites, and trails will be implemented.

6. QUOTAS AND GROUP SIZE

The maximum group size will be 6. Group sizes of up to 12 persons will be possible through a special use permit.

As in Alternative 3, the overnight quota will be administered by destination. The quota system will be in effect from April 1 through October 31. The numbers of overnight users will be dramatically reduced to reflect the reduced number of campsites provided. The daily quota for overnight use will be 264 persons. The overnight quota will be administered by zone.

A day use quota of 104 permits (approximately 320 day users) will be implemented in all areas. The numbers of users entering each trailhead will be regulated. The numbers of day users will be adjusted if social and resource standards were exceeded.

Outfitter/guides

Two equestrian guides will offer drop camp services and day rides under permit in Opportunity Class 2 areas only. (Drop camp trips are defined as those trips where the guide delivers and picks up campers and/or equipment, but does not accompany the visitors for the duration of their trip.) Guided use will occur at a level proportionate to the overall changes in quota numbers. Use will be allocated by zone. The outfitter/guides will be required to provide educational materials and information to their clients.

Off-site use for Deer Crossing Camp will not occur within the Desolation (off-site use will be granted at alternate locations outside the wilderness). Camp Sacramento, Berkeley Echo Camp, and Camp Concord will not receive updated permits for guided use within the Desolation, and a new permit will not be issued to Stanford Camp for such use. Camp participants may obtain their own permits to hike, without a guide, within the Desolation. Forest staff will work with camp staff to provide non-wilderness locations for staff guided hikes.

Guided Use Within the Desolation Wilderness Under Alternative 6

Outfitter/Guide or Camp Name	Allocated Service Days/Year	Unallocated Service Days/Year	Current 5 Year Avg of Service Days/Year
Camp Richardson	44	unlimited***	116
Cascade Stables	44	unlimited***	116

*** Service days are limited by the number of available slots open under the quota at the time of application.

7. AIRCRAFT OVER-FLIGHTS

A 4000 foot AGL (above ground level) mandatory minimum ceiling will be recommended to the FAA. The FAA, based on the Forests' recommendation, will then conduct its own scoping and analysis.

8. DOGS

Dogs will be prohibited within the Desolation. To allow for handicapped access, certified seeing-eye dogs will be permitted in all zones. These dogs will be restrained at all times.

9. TRAILS

All but the major trails will be removed. Such trails may be allowed to revert to natural conditions on their own or will be physically removed. The trails which remain will be maintained in primitive condition, and will be re-routed to avoid sensitive areas. The PCT (maintained to PCT standards) and those trails providing access from all trail heads but Van Vleck, Buck Island, and General Creek, will remain.

The Eagle Falls Bridge will be slated for removal.

Directional signing inside the wilderness will be eliminated.

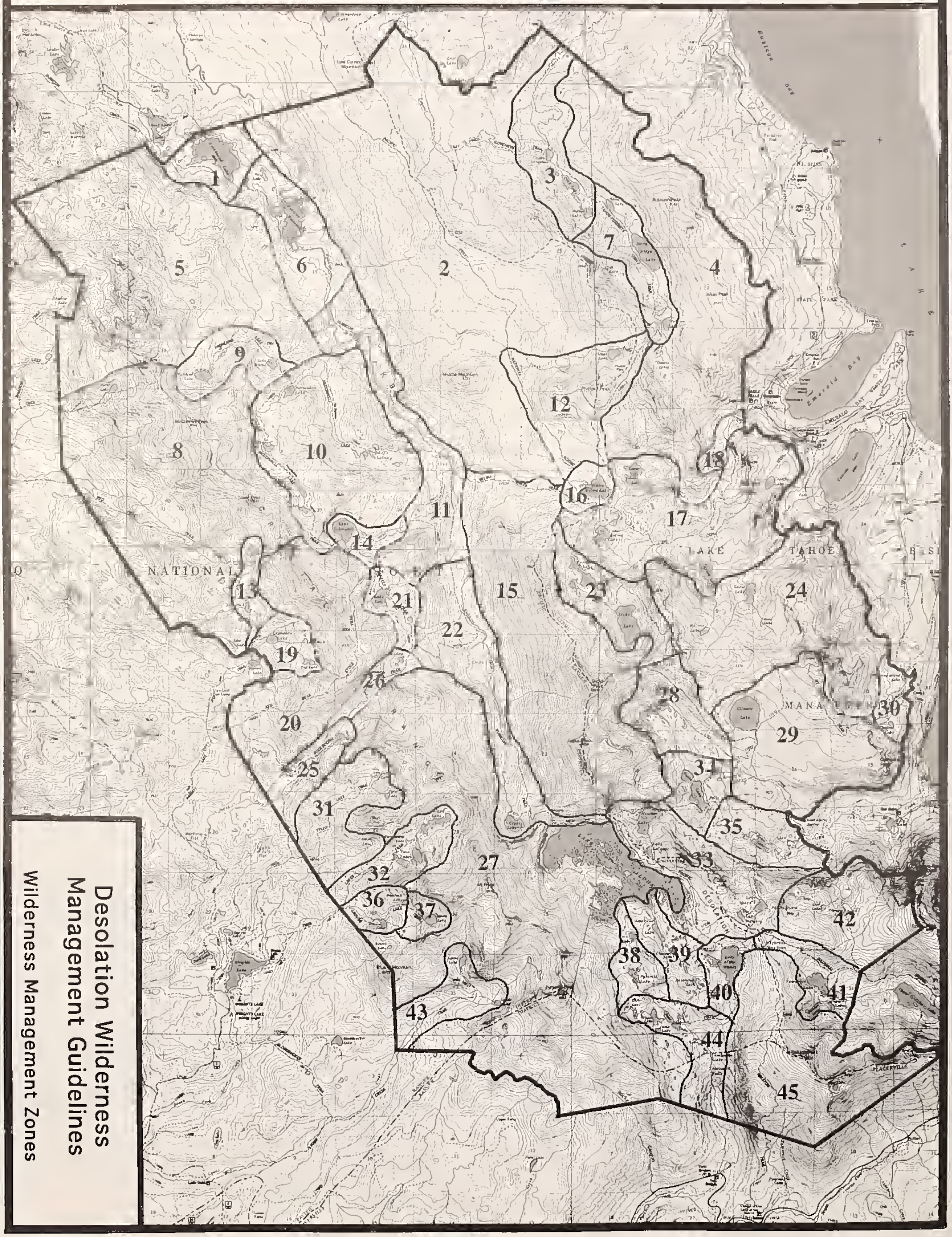
Where possible, trailhead capacity will be reduced to discourage use and achieve more primitive conditions. No new wilderness trailheads will be built. Facilities at existing trail heads may be modified or relocated if needed to protect resources or improve health and safety or accessibility as long as capacity is not increased over that needed to accommodate the trailhead quota. Twin Lakes Trailhead improvements will be completed, and restrooms and relocation and/or reduction of parking at Twin Bridges trailhead will be considered.

In all cases, before any trail construction, reconstruction or physical removal is initiated, site specific analysis will be completed.

LEGEND - Wilderness Management Zones

These zones will be managed to meet Opportunity Class Standards as described in the Alternatives.

NORTH Scale: 1:72,411 0 .5 1 Mile 1996



Desolation Wilderness Management Guidelines

Wilderness Management Zones

LEGEND - Management Zones in each Opportunity Class

Class 1 | Class 2 | Class 3 | Class 4

Class 5*

* Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH Scale: 1:72,111 0 .5 1 Mile 1980

Desolation Wilderness Management Guidelines

Alternative 1 - Maximum Opportunity

LEGEND - Management Zones in each Opportunity Class

Class 1 | Class 2 | Class 3 | Class 4

Class 5* * Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH

Scale: 1:72,411

0 .5 1 Mile

1956

Desolation Wilderness Management Guidelines

Alternative 2 - No Action (Current Situation)

LEGEND - Management Zones in each Opportunity Class

Class 1

Class 2

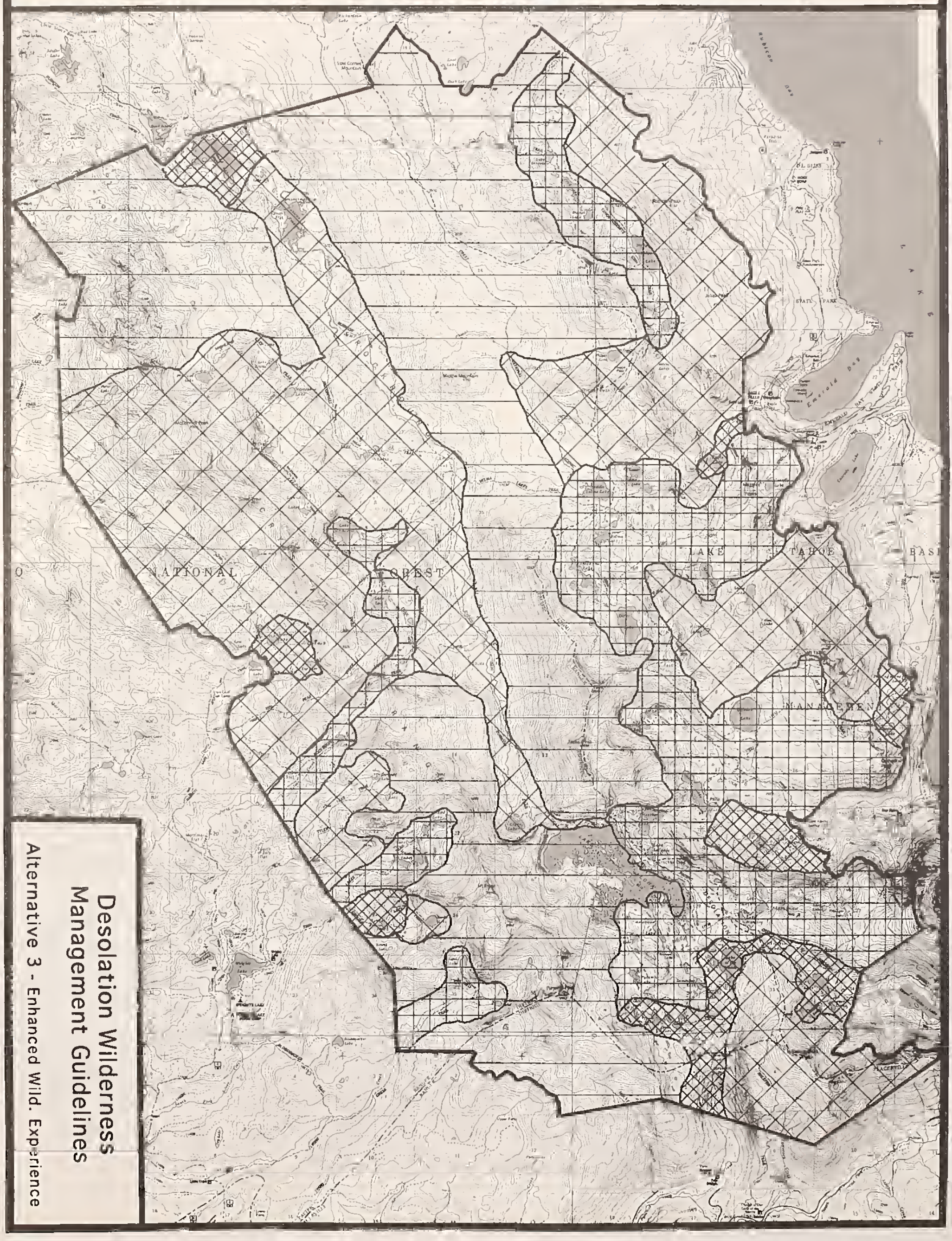
Class 3

Class 4

Class 5*

* Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH Scale: 1:72,411 0 .5 1 Mile 1936



Desolation Wilderness Management Guidelines

Alternative 3 - Enhanced Wild. Experience

LEGEND - Management Zones in each Opportunity Class

Class 1 | Class 2 | Class 3 | Class 4 | Class 5*

* Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH

Scale: 1:72 411

0 .5 1 Mile

Desolation Wilderness Management Guidelines

Alternative 4 - Physical Restoration

LEGEND - Management Zones in each Opportunity Class

Class 1

Class 2

Class 3

Class 4

Class 5*

* Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH

Scale: 1:72,411

0 .5 1 Mile

1996

Desolation Wilderness Management Guidelines

Alternative 5 - Enhanced Ecosystem

LEGEND - Management Zones in each Opportunity Class

Class 1

Class 2

Class 3

Class 4

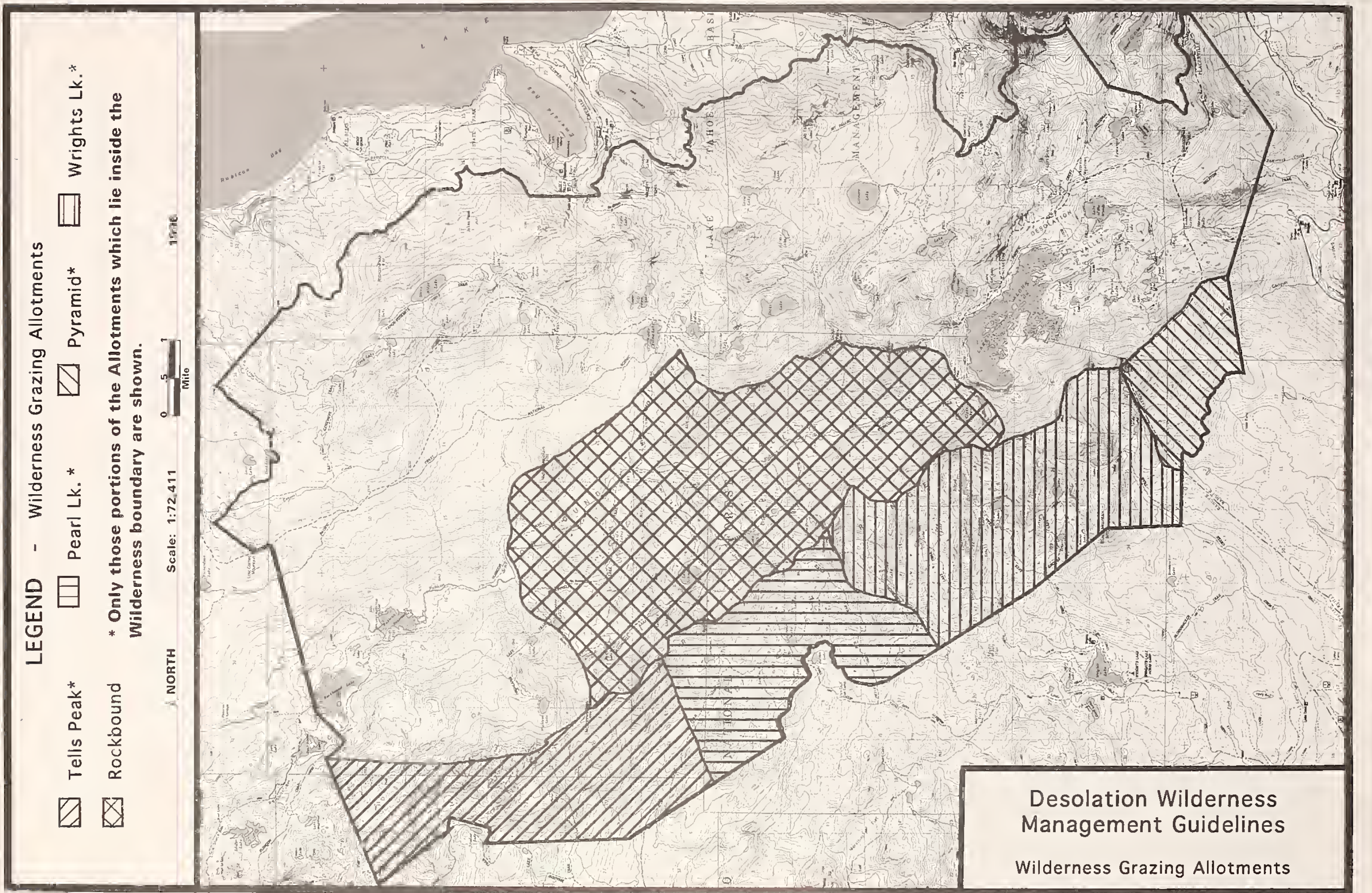
Class 5*

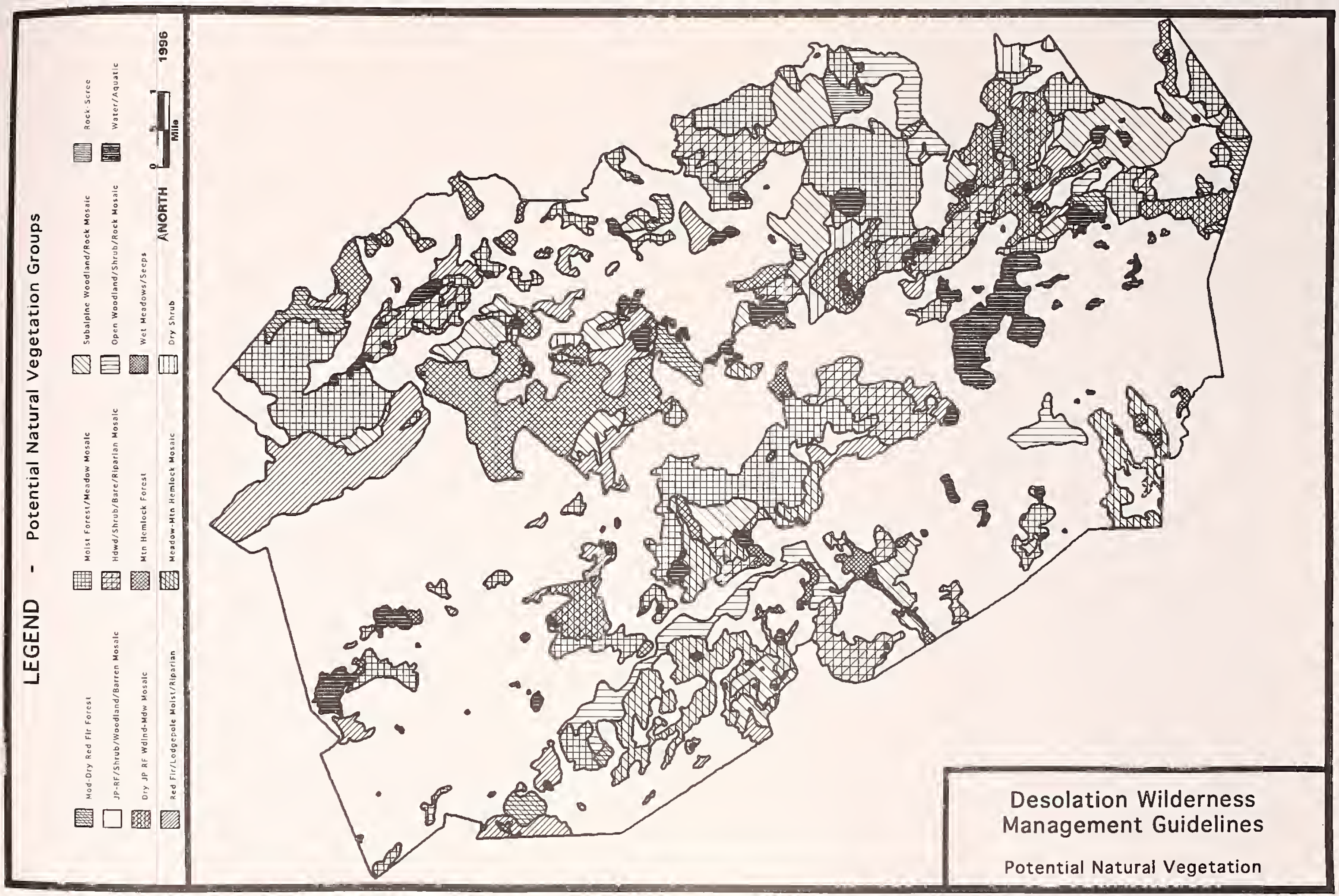
* Class 5 areas are those areas which exceed standards set for the Desolation Wilderness.

NORTH Scale 1:72,411 0 .5 1 Mile 1996

Desolation Wilderness Management Guidelines

Alternative 6 - Max. Wilderness Preservation


LEGEND - Wilderness Grazing Allotments
Tells Peak*
Rockbound
Pyramid*
Pearl Lk. *
Wrights Lk.*
* Only those portions of the Allotments which lie inside the Wilderness boundary are shown.
NORTH
Scale: 1:72,411
0 5 1 Mile
LAKE TAHOE BASIN MANAGEMENT UNIT
DESOLATION WILDERNESS
Rubicon Bay
Desolation Wilderness
Management Guidelines
Wilderness Grazing Allotments


LEGEND - Potential Natural Vegetation
Mod-Dry Red Fir Forest
Moist Forest/Meadow Mosaic
Subalpine Woodland/Rock Mosaic
Rock-Scree
JP-RF/Shrub/Woodland/Barren Mosaic
Hdwd/Shrub/Bare/Riparian Mosaic
Open Woodland/Shrub/Rock Mosaic
Water/Aquatic
Dry JP RF Wdlnd-Mdw Mosaic
Mtn Hemlock Forest
Wet Meadows/Seeps
Red Fir/Lodgepole Moist/Riparian
Meadow-Mtn Hemlock Mosaic
Dry Shrub
NORTH
0
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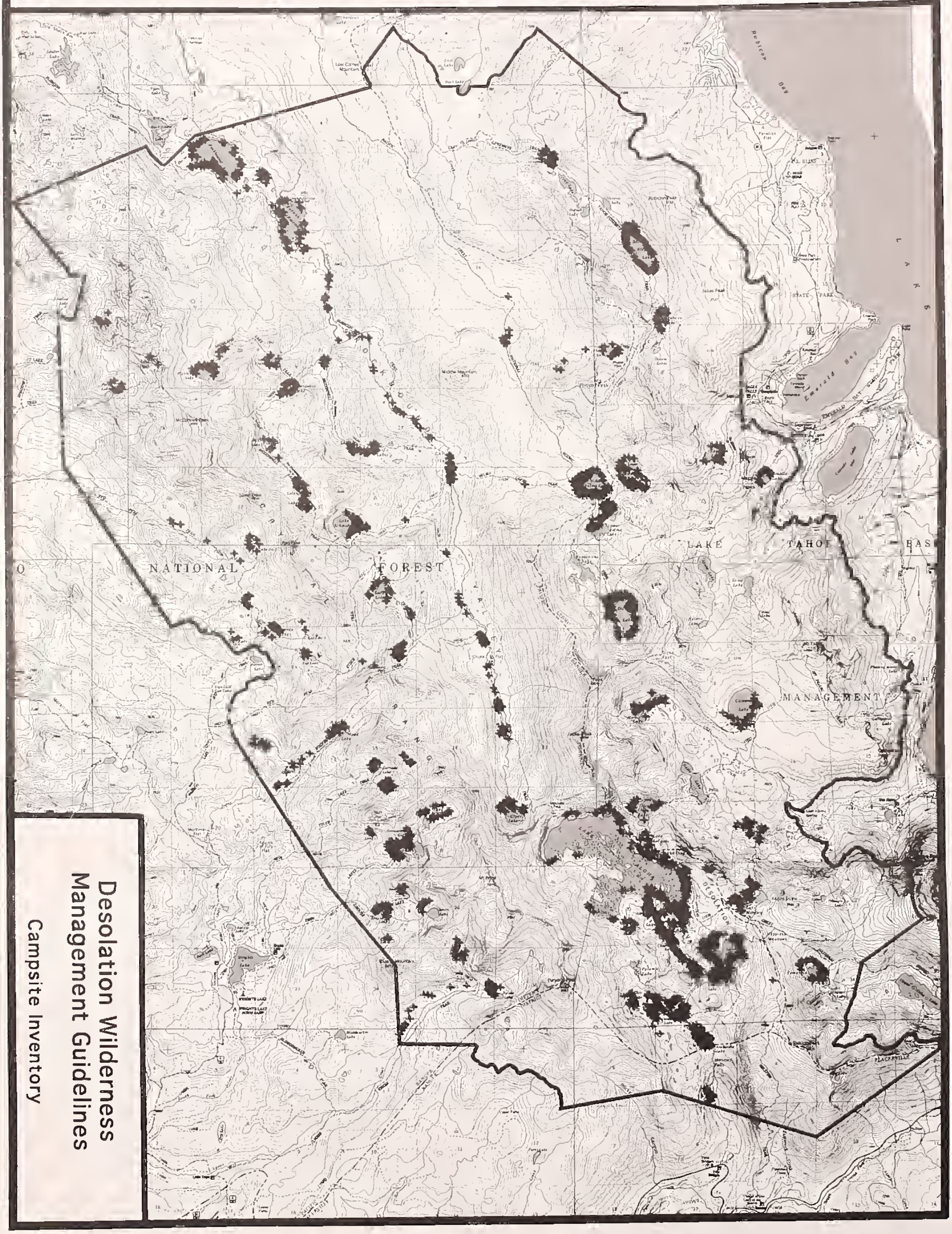
Mile
1996
Desolation Wilderness
Management Guidelines
Potential Natural Vegetation

LEGEND - Campsite Inventory

This map shows the location of over 1000 campsites inventoried during the 1992 and 1993 seasons. Some lakes and other areas have not been inventoried, so campsites are not shown.

NORTH Scale: 1:72,411 Mile 1996



Desolation Wilderness Management Guidelines

Campsite Inventory

Chapter 3

THE AFFECTED ENVIRONMENT

CHAPTER III - THE AFFECTED ENVIRONMENT

A. INTRODUCTION

This chapter describes the existing environment that will be affected by the implementation of any the proposed alternatives. It discusses the natural and human components of the ecosystem.

Discussion of the affected environment begins with a description of the area and then continues with descriptions of the biophysical environment, including climate and soils.

The chapter concludes with a discussion of the human use of the Desolation Wilderness, including a discussion of social conditions in the wilderness, actual and expected use levels, and the effect of Desolation Wilderness on the local and regional communities.

B. VICINITY DESCRIPTION

The Desolation Wilderness lies immediately west of Lake Tahoe along the crest of the Sierra Nevada in central California. It is located entirely within El Dorado County and is approximately 90 miles east of Sacramento by way of US. Highway 50. The area includes the headwaters of the Rubicon River, the South Fork of the American River, and numerous shorter drainages that flow into Lake Tahoe. Included within the Wilderness boundary are two Federal Regulatory Energy Commission (FERC) licensed dams. There are no valid mining claims in the wilderness. The Desolation Wilderness contains approximately 63,960 acres, with no private inholdings. (Acreage is the same as in 1978, however, a difference of 500 additional acres shown is a result of changes to computerized mapping technology.)

Watersheds within the Wilderness which drain into Lake Tahoe are administered by the Lake Tahoe Basin Management Unit (LTBMU). The remaining portion of the wilderness, approximately two-thirds of the acreage, is administered by the Eldorado National Forest. The Eldorado portion of the Wilderness lies mainly within the Pacific Ranger District. A small portion lies within the Placerville Ranger District boundary.

C. WILDERNESS QUALITY

An assessment of the Desolation's wilderness quality is based on the attributes by which the 1964 Wilderness Act defined wilderness: naturally occurring ecosystems, primeval character, the absence of man's imprint, and outstanding opportunities for solitude or a primitive and unconfined recreation experience. Generally these attributes describe either the naturalness of wilderness ecosystems or the social conditions (the "wilderness experience") available within wilderness. Noise, use levels, human improvements and structures, regulations, and other evidence of humans affect the wilderness experience of visitors.

Naturalness

The Desolation Wilderness generally appears natural on a large scale basis. It includes a variety of outstanding scenery and highly attractive mountain landscapes. There are many small streams and about 130 lakes, with some lakes as large as 900 acres in size. Glaciation is evident in rounded granite ridges and numerous lake basins, while natural erosion processes have produced some steep-walled canyons on the periphery. Some portions of the Wilderness provide summer range for deer and bear, while many smaller animals live in the Wilderness year round. The scenery, the area's many lakes, and the easy accessibility from major urban areas attract thousands of people to the Desolation annually, making this wilderness one of the most heavily used wilderness areas of its size.

Although much of the area has remained in a primitive state due to its topography and high elevation, the naturalness of the Desolation has been affected, to varying degrees, by recreation use; grazing; exclusion of fire; introduction of non-indigenous plants and animals including aquatic species; water projects; changes in air quality from sources outside the wilderness; and activities on adjacent lands. Few surveys of resource conditions within the Desolation have been completed, therefore little site-specific knowledge of resource conditions exists. Exceptions include campsite inventories, and surveys of sensitive plants and cultural sites during analyses of planned trail reconstruction projects.

Recreation use has historically been high within the Desolation and is of such magnitude that the naturalness of the wilderness, particularly in heavily used lake basins, has been substantially impacted by it. Portions of shoreline areas and popular campsites have been devegetated. Soils in these areas and along trails are compacted and sometimes eroded. Numerous campsites in interior areas of the wilderness, where use is currently relatively light, are devegetated from years of use. Campsite conditions in some lightly used areas may be improving, however, campsite conditions in several heavily used areas are downward tend (becoming worse). Recreation use affects the environment but, because those effects are highly localized, the overall effect on ecosystem function is probably minimal. The proportion of the Desolation that is affected by recreation use is unusually high relative to other wilderness areas (Cole, personal communication).

The naturalness of the Desolation has also been affected by more than one hundred years of grazing. Cattle and sheep were grazed historically in many areas of the Desolation. The numbers of livestock and the areas of grazing have both declined substantially since that time. Grazing is known to cause changes to soils, vegetation and aquatic systems (Cole 1994). Research has shown that, over time, grazing can bring about permanent changes in ecosystems through changes in plant composition, even in the absence of site degradation (Franklin and Bloedel 1990). Because of the long history of grazing within the Desolation, plant species composition and other changes have occurred over time. Often such vegetational changes are irreversible, however, the extent to which such changes have occurred in the Desolation is unknown (M. Foster, personal communication).

Currently thirty-nine percent of the Desolation is within grazing allotments. Because much of each allotment is unsuitable rangeland, grazing is often concentrated in riparian areas and in lake basins which are frequently popular recreation destinations. In such areas, some shoreline areas are devegetated and compacted by both recreational use and grazing. The effects of the current grazing regime are mostly evident in these localized, high use areas. Congressional guidelines

for wilderness state that grazing which pre-existed wilderness designation shall be permitted to continue, and will ordinarily be controlled under general regulations governing grazing of livestock on National Forests.

Through much of the 20th century, both human-caused and lightning-caused fires have been suppressed in the Desolation. Lightning-caused fires played an important ecological role in the past. The functions that such fires performed included: preparing seedbeds, cycling nutrients within the system, adjusting successional patterns, modifying conditions affecting wildlife, influencing the vegetation mosaics, altering the numbers of trees susceptible to insects and diseases, and both reducing and creating fire hazards (Kilgore 1973). The suppression of fire within the Desolation has affected natural conditions, although the extent to which this has occurred is unknown.

The lakes within the Desolation were originally fishless, with the exception of several lakes which may have supported 4 non-salmonid native species. The natural conditions in these aquatic ecosystems have been influenced by the introduction of trout into 98 of approximately 130 formerly fishless lakes, leaving fishless 140 acres (7%) of the 1,992 acres of lakes and ponds within the Desolation. All of the larger, deeper lakes have been stocked. Research has shown that the introduction of fish to fishless lakes has the potential to significantly affect entire aquatic ecosystems. It can reduce, displace or eliminate competitors and prey organisms (Cole 1990). It may result in the elimination of large bodied invertebrates. Some of these invertebrates have terrestrial stages which are used by insectivorous birds. Amphibian populations may be affected by the introduction of trout. As early as 1924, Joseph Grinnell noted that the introduction of trout to fishless lakes negatively affected Mountain yellow-legged frog populations (Knapp 1994). Mountain yellow-legged frogs have been identified within the Desolation. Adult frogs have been located at a number of lakes where trout exist, and tadpoles have been identified in some waters where fish are present. However, the majority of the Desolation's lakes have not been surveyed for amphibian populations: surveys are currently underway.

Research suggests that nutrient-poor systems, such as those in most Desolation lakes, are particularly sensitive to introductions of exotic species and become unstable after exotics become established (Li and Moyle 1981). Recent studies suggest that the "ecological impacts of alien fish species on indigenous aquatic communities may be severe, long lasting and widespread" (Bahls 1992). Within the Desolation Wilderness, the potential for impacts due to fish stocking is high, but the nature and extent of the impacts have not been assessed.

The Desolation is known to contain small numbers of beaver which are presumed to migrate in from the Lake Tahoe Basin. Beaver are not indigenous to the high Sierra, but were introduced to the Lake Tahoe area in the 1940s. Beaver have localized effects in areas where present. Other exotic species, including plants, occur within the Desolation.

The Desolation contains 22 small streamflow maintenance dams and two major FERC licensed dams. The streamflow maintenance dams, when properly operated, maintain streamflows in late summer to sustain trout fisheries. Water is released from the FERC licensed dams to provide downstream uses for power and water. These dams have localized effects on the naturalness of stream courses. The Desolation also contains the following structures: a snow pillow at Lake Lois, snow survey courses at Echo Peak and Lake Lucille, one cabin (China Flat) and several allotment fences.

The developments and activities which occur on lands adjacent to wilderness, may affect the naturalness of wilderness ecosystems. Wilderness areas of under 100,000 acres, in particular, should be managed as part of a larger landscape (Harris 1984, cited in Cole 1994). The naturalness of ecosystem processes within the Desolation may be impacted to some degree by logging activities adjacent to the wilderness, by changes in forest characteristics due to fire exclusion, by general human presence and use of adjacent forest, and by continued development of areas near the wilderness. Although the extent of these impacts is unknown, they have likely affected distribution and movement patterns for some wildlife species.

Finally, air quality within the wilderness can be affected by wildfires and prescribed fires either occurring inside or outside of the wilderness and by air pollution from outside sources. Forest air quality monitoring has shown that the lakes, vegetation, and visibility within the Desolation have been effected to some degree by air pollutants.

Wilderness Experience

The wilderness experience of the Desolation visitor may be influenced by crowding, or opportunities for solitude, by perceived naturalness of the area, and by the restraints placed on the visitor by wilderness administrators. How the visitor responds to these conditions depends, to large extent, on the visitor's expectations of the area.

Because most of the use within the Desolation is concentrated in a small percentage of the area, the majority of the Wilderness receives light human use and provides outstanding opportunities for solitude. However, lakes and trails which are easily accessed receive very heavy use and provide minimal opportunities for solitude. In addition, conflicts between different types of use often occur in these areas. Conflicts between stock users and backpackers are minimal due to low overall use by equestrian groups. Conflicts also occur between some wilderness users and dogs.

Correspondence with the public indicates that even in those places where range condition is good, concerns about the presence of manure in the vicinity of lakes and campsites and the trampling of lake shore vegetation affect the wilderness experience of some recreation users. During the time that cattle are present, the noise generated by cowbells detracts from wilderness quality for some and enhances it for others.

Many recreation users find that the presence of stocked fish enhances their wilderness experience. Others, who may or may not fish, find their wilderness experience diminished by the fact that non-native fish are present.

The streamflow maintenance dams blend into the environment, affecting the perceived naturalness of the area to a limited extent, while the two large reservoirs, at low water, create a large "bathtub ring" appearance which is intrusive to many recreation users.

The visitor to areas within the Desolation which are close to the wilderness boundary should expect to hear sounds from traffic, road blasting and timber harvesting which originate outside the wilderness. Those visitors using portions of the wilderness close to off-highway vehicle routes frequently hear the sounds of motorized travel. Only within the more remote areas of the wilderness are these sounds absent. The noise from over-flying aircraft is common in all areas of the wilderness, but seems to be most prevalent in Desolation Valley. Noise intrusions also occur due to recreational shooting and dogs barking. These noise intrusions detract from the wilderness

quality of the area to varying degrees depending on the type of noise and the expectations of the listener.

Recreation users are relatively free from constraints once inside the Desolation. All users are required to get wilderness permits, and overnight users are limited by a quota to entry at trailheads where space is available. However, once inside the wilderness, visitors may travel and camp where they wish. Regulations specific to the Desolation are few in number. Specific regulations prohibit campfires and limit the size of groups to 15 persons. The number of wilderness rangers has fluctuated in recent years. Wilderness staffing is similar to that of the late 1970s, however, wilderness use has increased during the same period. Rangers enforce wilderness regulations strictly, issuing 304 citations in 1993. They also provide information and education for visitors, and improve the naturalness of the area by cleaning up campsites, illegal fire rings, and litter.

D. NATURAL COMPONENTS OF THE ECOSYSTEM

1. CLIMATE

A Mediterranean-type climate extends over the Desolation Wilderness. This climate is characterized by mild, warm, fairly dry summers and cold, wet, snowy winters. Average annual precipitation varies from 40 to 70 inches. This precipitation falls mainly from October through April in the form of snow. Winter temperatures below zero degrees Fahrenheit and summer temperatures above 100 degrees are the normal seasonal spread. A snowpack of 5 to 10 feet or more is usually present from December to May.

2. SOILS

Of the 64,160 acres in the Desolation Wilderness, 48,692 acres are mapped as rock outcrop, rock rubble land or stony colluvial land; 2,174 acres are mapped as water; and 13,294 acres are mapped as soils derived from granitic bedrock and glacially or alluvially deposited material (USDA Forest Service, 1984 and USDA Soil Conservation Service, 1974). Thus, approximately 75 percent of the Desolation Wilderness area is composed of glacially-scoured bedrock or barren rocky areas, 5 percent is covered by water, and only about 20 percent of the wilderness is covered by soils. Even though only a small portion of the wilderness is covered by soils, these areas are significantly important, because they influence hydrologic function of the watersheds, support most biologic activity and ecosystem function, and are the focus areas for recreation use and other management activities.

Soils in the Desolation Wilderness, which are derived from glacially or alluvially deposited material, include Meeks, Tallac, Tinker, Gerle, and Notned series, as well as Aquepts, Umbrepts, Cryumbrepts, Cryumbrepts-wet, Xerumbrepts, gravelly alluvial land, and loamy alluvial land. Soils derived from granitic bedrock include Cagwin and Toem series. In general, all these soils are found in valleys and along stream channels, where most recreation use occurs, while the steep slopes and mountains are typically glacially-scoured bedrock. Specific locations of these soils can be determined from the Eldorado National Forest Soil Survey (USDA Forest Service, 1984) and the Tahoe Basin Area Soil Survey (USDA Soil Conservation Service, 1974). For site-specific project or rehabilitation planning, a soil scientist will need to field verify soils present in a given location.

Soil depths range from less than 20 inches to greater than 60 inches. The Toem series is shallow, less than 20 inches deep. The Cagwin and Tinker series are moderately deep, from 20 to 40 inches deep. The Meeks, Tallac, Gerle and Notned series, and Cryumbrepts, Cryumbrepts-wet, Xerumbrepts, Aquepts, Umbrepts, gravelly alluvial land, and loamy alluvial land soils are deep to very deep, from 40 to greater than 60 inches.

In general, the deeper soils have greater water holding capacities to support plant growth and other biologic activity, compared to shallow soils. However, all soils in the wilderness have only very low to moderate available water holding capacity. As a result, soil water available for plant growth is limited, and may limit rate of recovery for vegetation impacted by disturbance with recreation use or grazing.

Most soils are well drained to excessively drained; however, the Cryumbrepts-wet, Aquepts, Umbrepts, gravelly alluvial land, and loamy alluvial land soils are somewhat poorly drained to poorly drained. These poorly drained soils have a seasonally high water table, and may be flooded during spring snowmelt or periods of high precipitation runoff. In addition, the Meeks and Tallac series may have a perched water table during spring snowmelt, due to the presence of a silica cemented pan in the substratum.

When wet, these soils which have a seasonally high water table are particularly susceptible to soil compaction from recreation traffic or livestock. When soils become compacted, soil pore space is reduced, water infiltration and soil aeration are inhibited, and plant root penetration is restricted by increased soil bulk density; thus, recovery of impacted vegetation is inhibited in compacted soils. In addition, degradation of water quality due to improper sanitation practices may be a problem in these areas which have high water tables or are seasonally flooded.

All soils in the Desolation Wilderness are classified taxonomically as having frigid or cryic temperature regimes, which indicates that the mean annual soil temperature is below 8 degrees Celsius (47 degrees Fahrenheit). In addition, the average number of growing days in a year ranges, on average, from only 50 to 65 days. With these cold soil temperatures and short growing season, biologic activity, such as plant growth and function of soil microbes, is severely limited. Thus, when plant communities or populations of soil microbes are impacted by disturbance with recreation use or grazing, their recovery process typically is extremely slow.

Soils are subject to the maximum hazard of erosion when the protective cover of vegetation and organic litter layers are removed. In general, the maximum erosion hazard is low for soils on slopes less than 15 percent, moderate for soils on slopes from 15 to 30 percent, and high or very high for soils on slopes greater than 30 percent (USDA Forest Service, 1984 and USDA Soil Conservation Service, 1974). The maximum erosion hazard may be greater in areas with rock outcrop, where surface runoff water is concentrated. In the wilderness, erosion is considered accelerated when due to vegetation that is trampled or denuded, or due to bare mineral soil that is exposed by grazing or recreation use.

Both short-term and long-term soil productivity are decreased when vegetation and organic litter layers are removed by recreation use, such as camping and firewood consumption, and by grazing. The exact degree of potential loss in soil productivity is unknown; however, given that these wilderness soils generally have only low to moderate natural productivity, any loss may significantly impact ecosystem function, and the ability of soil microbes and vegetation to recover from disturbance by recreation use or other management activities.

Soil resource conditions in the Desolation Wilderness have been assessed through range allotment analysis, and through campsite condition inventories. In general, soil conditions are good on range allotments in the Wilderness, with a trend that shows continued good conditions. A few localized areas in allotments show evidence of soil impacts and erosion losses, most notably at the top of the Red Peak Stock trail, on the steep slopes to the west-southwest of Schmidell Lake, along the upper reaches of Forni Creek, and at the pond southwest of Pyramid Peak. In contrast, soil conditions in campsites are generally fair to poor. The most severe soil impacts occur in the barren core areas of campsites, where loss of vegetation and organic litter layers, exposure of bare mineral soil, soil compaction, and erosion are significant. Typically, these severely impacted campsites occur in high use areas, such as Eagle Lake, Avalanche Lake, Grouse Lake, Twin Lake, Lake of the Woods, and others. For perspective, these severely impacted campsite areas are estimated to cover less than 1 percent of the total ground in the Desolation Wilderness.

In summary, soils in the Desolation Wilderness have very low to moderate available water holding capacity, have low mean annual soil temperatures, experience a short growing season, are subject to high or very high erosion hazards on slopes greater than 30 percent, have low to moderate natural productivity, and in specific locations, have a seasonally high water table and are susceptible to compaction. In addition, current impacts to soil resources, such as compaction, loss of vegetation, exposure of bare mineral soil, accelerated erosion, and possible decline in soil productivity with loss of soil organic material and woody debris, are severe in many campsites which have sustained heavy recreation use and in localized areas within grazing allotments. Management decisions regarding resource impacts and recreation use will need to consider how these soil characteristics influence the ability of vegetation and soil microbes to sustain and recover from disturbance by recreation use and grazing, and to what extent water quality may be impacted by improper sanitation.

3. AIR QUALITY

Desolation Wilderness is a Class I Area as designated by the Clean Air Act amendment of 1977. Through this legislation the Federal land manager is assigned the affirmative responsibility to protect Air Quality Related Values (AQRVs) in Class I Areas from adverse impacts of air pollution. These AQRVs in Desolation Wilderness include visibility, water quality, flora, fauna, soils and geology. Visibility protection includes not only the quality of vistas within the Wilderness during the daytime, but those enjoyed at night when viewing the planets and stars without dilution and/or light scattering from city lights.

Air Quality Standards

Desolation Wilderness lies within two California Air Basins as delineated by the California Air Resources Board. These include the Lake Tahoe Air Basin, containing the eastern third of the Desolation, and the Mountain Counties Air Basin, containing the western two thirds of the wilderness. Air quality in these air basins must comply with the California Ambient Air Quality Standards (CAAQS) as stated in Table B-1 (see Appendix B - Air Quality). These standards are State regulations established to protect public health from adverse effects from air quality degradation. They are stricter than the Federal Ambient Air Quality Standards. In 1991, the Lake Tahoe Air Basin did not attain the CAAQS for carbon monoxide. In the same year, the Mountain Counties Air Basin was in non-attainment per the CAAQS for ozone and particulate matter less than 10 microns. Other CAAQS were in attainment for the two air basins.

Meeting state and federal standards, though, may not ultimately protect the Wilderness from adverse air pollution effects. Should its ecosystem suffer from air pollution inputs less than these standards, measures must be taken to reduce the source emissions impacting Desolation and safeguard its AQRVs.

Sources of Air Pollution

Before European settlement, visibility conditions often included baseline smoke from local and regional wildfires.

Desolation Wilderness is at risk to adverse effects of air pollution both from within its borders and from the region which surrounds this area. Activities within Desolation Wilderness that can potentially have an adverse air quality effect include smoke from campfires, wildfires and prescribed fires. Impacts can include reduced visibility as well as adverse effects to human and ecosystem health. Wildfires may be the most significant threat to Desolation in areas where successful fire suppression has resulted in artificially dense stands of brush and trees. This resulting fuel loading, if ignited, may incur significantly more smoke emissions than might occur had natural fire been allowed to burn without suppression.

Activities upwind of the Wilderness that may degrade this area's visible air quality as well as threaten human and ecosystem health include smoke from prescribed burns, wildfires (as described above) and/or fireplaces and wood stoves. Visibility impacts can also result from fugitive dust from activities such as vehicular travel on unpaved roads and wind erosion of unvegetated areas. Other air pollutants include carbon monoxide, nitrous oxides, sulfur dioxides and ozone which can not only degrade visibility within the Wilderness but harm riparian, terrestrial and cultural resources.

In "Guidelines for Evaluating Air Pollution Impacts on Class I Wilderness Areas in California" (Peterson 1992) estimates of pollutant deposition for Desolation Wilderness are the following: 2.0 to 2.7 kilograms per hectare per year (kg/ha/yr) total annual nitrogen, 0.6 to 1.4 kg/ha/yr.. total annual sulfur and 22 to 50 parts per billion mean ozone concentration (24-hour mean, May through October). These estimates are based on data collected from sites other than Desolation Wilderness.

The origin of many of these air pollutants include point sources (i.e. power plants, incineration plants, pulp mills and other stationary sources) and non-point sources (vehicles, unpaved/unvegetated roads, agricultural burns). The sources of these "outside" activities include the Sacramento Valley, Reno and the Lake Tahoe Basin. Each of these areas is expected to continue growing in developments and population, which can lead to corresponding increased air pollutant emissions.

AQRV Inventory and Monitoring

An improved network of wildland air quality monitoring is necessary to supplement our knowledge of atmospheric deposition in Class I areas such as Desolation. In addition, long term monitoring of AQRVs is essential for establishing baseline information and measuring changes within the ecosystem of Desolation that are due to air pollution. Such information is crucial for estimating pollution impacts and evaluating applications for new point sources.

Indicators to AQRVs that are currently being monitored in Desolation Wilderness include lichen species sensitive to general air pollution, lake water chemistry responsive to acid deposition, daytime visibility and, to a limited extent, Jeffrey pine, a species sensitive to ozone pollution. Table B-2 provides elemental data on lichen species analyzed in 1986 and 1988. Table B-3 provides visibility data collected to date since 1988. Table B-4 provides chemical data for lakes sampled in Desolation Wilderness. (see Tables in Appendix B - Air Quality)

Some of the air quality data collected so far from Desolation Wilderness indicate that air pollution has already had an impact to the resources within this area. A cursory survey of *Pinus jeffreyi* on August 19, 1992 near Granite Lake (a tributary lake to Emerald Bay, Lake Tahoe) indicates that ozone injury has occurred to five of the eleven pines rated. A study by University of California, Santa Barbara has shown elevated wet deposition rates of ammonium, nitrate and sulfate (personal comm. with Jim Sickman, UC Santa Barbara). Such studies need a continuum to track air pollutant effects and identify trends as an important step in protecting the air resources within Desolation Wilderness.

Role of Federal Land Manager

The Clean Air Act designates the Federal land manager to affirmatively protect the AQRVs in Class I air areas. In addition to inventorying and monitoring AQRVs, this role includes responding to permits for new or retrofit facilities that may potentially emit pollutants harmful to a Class I wilderness. The role of the Federal land manager is also to actively participate with federal, state and local air regulatory agencies to protect wilderness resource values. This includes cooperating with these agencies in assessing air quality monitoring needs as well as in the development of revisions of air quality standards and regulations that affect wilderness resources. The role also includes implementing public education methods through civic and school presentations, videos, brochures, interpretive talks, etc.

4. FIRE

Fire history records for Desolation Wilderness have been maintained by the Pacific Ranger District and LTBMU since 1960. In this 33-year period, 381 fires occurred within the present wilderness boundary. Of these fires, 250 (66%) were caused by campfires, 7 (2%) by smoking, and 124 (32%) by lightning. In terms of size, 375 (99%) were less than one-tenth acre; the other three were 13, 19, and 12 acres in size. See Figure 3-1 for fire locations and Table 3-1 for the number of fires by decade.

One hundred sixty-six (44%) of the total fires in the Desolation occurred on the Pacific Ranger District, which contains somewhat less than two-thirds of the total wilderness acreage. Of these fires, 81 (49%) were caused by campfires, 7 (4%) by smoking, and 78 (47%) by lightning. The three larger fires that occurred during this period were all on the Pacific Ranger District. Two hundred fifteen (56%) of the total fires occurred on the LTBMU. Of these, 169 (78%) were caused by campfires and the remaining 46 (22%) were caused by lightning.

Over the last 33 years there were 375 fires in the wilderness that were less than 10 acres in size. These smaller fires averaged approximately one-tenth acre in size. Averaged out for this 33 year period, this amounts to approximately 11 acres/decade burned by smaller wildfires, or 1.1 acres burned per year.

In 1990, wood campfires were no longer permitted in Desolation Wilderness. Since then, person-caused fires have averaged 1.5 per year. In the 31 years prior to this ban the average was 8.29 person-caused fires per year.

Six fires greater than 10 acres in size have occurred within the Wilderness, as documented in Forest Service records dating back to 1910. In 1917, a large fire burned over the present wilderness boundary in the Meeks Creek drainage in the northeast corner of the Wilderness. The arson caused fire was approximately 480 acres in size. In 1924, a campfire escaped in the area of what is now Lake Aloha and burned 180 acres. In 1929, a lightning fire started near Tyler Lake and, driven by north winds, burned west to Wrights Lake. This fire was approximately 1,000 acres in size. In 1961, a lightning fire started in the Rubicon River drainage, near the northern border of the present wilderness, and burned 13 acres. In 1985, a campfire escaped near Cup Lake and burned 19 acres. In 1987, a lightning fire burned 12 acres in the area between Tells Peak and Rockbound Lake. See Figure 3-1 for large fire locations. Averaged out for the 84 year period, this amounts to approximately 242 acres per decade burned by large fires, or 24.2 acres burned per year.

Including the acreage burned in large fires, an average of 11 fires have burned approximately 25.3 acres each year within Desolation Wilderness. It is estimated that the number of acres burned has been influenced by past suppression actions. Most of the acres burned by wildfire in this wilderness are the result of infrequent large fire events. The overwhelming majority of the fires that have occurred in this wilderness have been suppressed at less than 1 acre in size.The number of fires occurring each year has dropped substantially since the closure on campfires.

Currently, if a wildfire starts on the portion of the Desolation administered by the Eldorado, the resources dispatched to suppress the fire come from the ENF, and all dispatching operations occur at the Emergency Command Center in Camino, California. If a wildfire starts on the portion of the wilderness administered by the LTBMU, the resources dispatched to suppress the fire come from the LTBMU, and all dispatching operations occur at the Emergency Command Center in Minden, Nevada. Under current policy, control is the only suppression option available when a fire occurs on the ENF portion of the wilderness. The LTBMU has an approved interim Fire Management Action Plan which allows the LTBMU to use confine, contain, and control suppression strategies which allow up to a maximum fire size of 25 acres.

Fire exclusion practices over the last 70+ years have helped shape the vegetation and fuelbed conditions that exist today. As a result of these conditions, the risk of the occurrence of large, stand replacing fires is greatest in the following areas of the Desolation: the Meeks Creek and General Creek drainages in the northeast corner of the wilderness, the upper reaches of Rockbound Valley, and along the southern and western boundaries of the wilderness. These same areas, excluding Rockbound Valley, are also the locations where a fire burning inside the wilderness could escape into adjoining forested areas outside the wilderness. Around the remaining perimeter of the wilderness, there are scattered pockets of forested lands with continuous fuels where fire could burn freely across the boundary line.

Figure 3-1.

Desolation Fire History Map, 1960-1992*

* The large fires which are displayed occurred between 1910 and 1992.

Table 3-1

Fire Statistics for Desolation Wilderness, 1960-1992

YEAR	ELDORADO	LAKE TAHOE BASIN	TOTAL
1991-1992			
Campfires	2	1	3
Lightning	3	2	5
1981-1990			
Campfires	17	53	70
Smoking	3	0	3
Lightning	28	20	48
1971-1980			
Campfires	30	61	91
Smoking	4	14	4
Lightning	11	19	5
1969-1970			
Campfires	6	19	25
Lightning	1	1	2
BEFORE WILDERNESS DESIGNATION			
1960-1968			
Campfires	26	35	61
Lightning	35	9	44
TOTAL FIRES	166	215	381

TOTALS

250 Campfires
7 Smoking
124 Lightning
257 Human Caused Fires Between 1960 and 1992
124 Lightning Caused Fires Between 1960 and 1992

In both the areas of wildfire and prescribed fire, the risk of fire escaping the wilderness is always present. Private land ownership parcels surround the wilderness boundaries on all sides, coming as close as 1/4 mile in several areas. There are three California State Parks and numerous private resorts, camps, and subdivisions along the east side of the wilderness. There are also several Forest Service summer home tracts bordering the southeast corner of Desolation. The Highway 50 corridor runs along the southern boundary with the communities of Echo Summit, Little Norway, Phillips, Twin Bridges, and Strawberry. There are numerous communities and the city of South Lake Tahoe within five air miles of the Wilderness boundary on the east edge of Desolation.

The Lake Tahoe Airport is downslope of Desolation and less than five air miles from the eastern boundary of the Wilderness. Highway 89 runs parallel to the east boundary of Desolation, coming within 1/4 mile of the boundary in the Emerald Bay area. Although Desolation was

established and is managed as wilderness, it is bordered on two sides by densely populated communities, cities and major interstate highways. The greatest potential for a large escape is along the south and west boundaries during a north wind event or in the Meeks, General, and Rubicon Creek watersheds under extreme fire weather conditions.

Fires burning under normal conditions in this wilderness are typical of those in higher elevation conifer forests with fuel beds of short, packed needles and deep duff. Fire behavior is usually of a slow, creeping surface or ground fire with short flame length (less than 4 feet). Spotting under these conditions is not common, and surface rock and/or water usually block spread, keeping the fires at very small sizes. Severe fire behavior can occur in this area if the following set of conditions exists: 1) the Eldorado Forest Burning Index is greater than 80, 2) the ignition component is 60 or greater 3) live fuel moisture is at critical levels, and 4) a moderate to strong wind event occurs. Usually these conditions exist less than 5 percent of the time in a normal fire season. Long-term drought can extend this burning window up to several months, as was the case in 1986 through 1990 and in 1992. Spotting is common under severe burning conditions and can be a major contributor to fire spread rates in this area.

Pre-European Settlement Fire Regime

Wildland fires are diverse, and the range in diversity among fires might be summarized as differences in fire regimes. The return fire interval, seasonality, dimensions, and fire characteristics can be used to develop the spectrum of fire regimes (Martin and Sapsis, 1991; Kilgore 1981; Heinselman 1981 and Gill 1975). Prehistoric fire intervals can be reconstructed using long-lived trees useful in dendrochronology and fire history, but the intensity and spread require more detailed assessment of overall stand structure.

The impact of fire on the environment of Sierran conifer forest varies with intensity and frequency. Fire can perform the following functions in ecosystems (Kilgore 1973): prepare a seedbed, cycle nutrients within the system, adjust the successional pattern, modify conditions affecting wildlife, influence the mosaic of age classes and vegetation types, alter the numbers of trees susceptible to disease and insects, and both reduce and create fire hazards.

The Desolation Wilderness has vegetation varying from dry to moderately moist red fir and Jeffrey pine forests, to moist red fir-lodgepole pine forests, non-forested meadows, and subalpine types found at the higher elevations. The subalpine types range from closed canopy dense stands of mountain hemlock, to very open, rocky forests dominated by various species of pine. For a complete description of individual vegetation types and their fire ecology, see the vegetation section. The most frequent fire intervals are in the ponderosa pine and mixed-conifer type forests on the west side Sierra Nevada. The pattern and influence of fire in red fir and subalpine forests is less clear and probably less significant (Kilgore 1971). Studies of fire in a red fir forest indicate that fire frequency and extent in these higher elevation areas were considerably less than those found in the middle-elevation mixed conifer forests. A study of fire intervals in red fir forests in the Southern Sierra found the mean fire-free interval to be 65 years (prior to 1920) and 78 years if the more recent period is included (Pitcher 1987). In the Southern Cascades, a fire return interval of 53.6 years (range 30-101) was found on the Swain Mountain Experimental Forest of the Lassen National Forest (Taylor 1991).

A fire regime model developed for the Camp Creek Watershed of the El Dorado National Forest (Neill et al. 1992) characterized fires in the red fir zone as mostly small (0.5-5 acres) and of medium to low intensity, due to the high association of precipitation with lightning strikes. Red fir forests have a pattern of burning irregular shaped areas with varying spread rates, possibly related to the variations in fuel-type pattern and fuel-moisture content, as well as to local topographic variations and weather conditions (Kourtz and O'Regan 1971; van Wagtendonk 1972).

A recent study by Ferrell (1994) on red fir forests of the El Dorado National Forest found that fire, even in the higher elevation zones, may have been more frequent than was previously believed. The fire regime is described as variable, with frequent low intensity surface fires and long interval stand replacing fires. The higher fire frequency is attributed to direct management by both Native Americans and early settlers, which maintained the stands in a more open condition with reduced fuel loading and lower stand densities of smaller trees. Ethnographic evidence indicates that Native Americans used fire extensively to alter California landscapes, however, evidence for the use of fire in high alpine areas is limited. In these areas lightning is believed to be a more active force in past fire regimes (Lewis, 1973).

Less information is available on the fire regimes of subalpine areas. Higher elevation subalpine forests have less spread, although they may have more frequent fires of lower intensity and smaller dimensions. They also have shorter growing seasons, so the hazard of allowing lightning fires to burn in national parks and wilderness areas is lessened (Kilgore 1973). In moister lodgepole pine environments, Keeley (1981) cited a naturally low fire frequency and observed that even after extended long fire-free intervals, fuel and moisture conditions preclude extensive crown fires. DeBenedetti and Parsons (1979) concluded that fire is a natural component of meadow ecosystems, and as such, naturally occurring fires should be allowed to burn when fuel loading is not so high as to cause unacceptable site degradation. Aspen stands reproduce almost exclusively by root suckers, and their initiation is prompted by disturbance of the established aspen overstory by cutting, disease or insect outbreaks, or by fire (Bartos and Mueggler 1979). Montane chaparral species are affected by the season of fire, level of fuel consumption and the fire intensity, all of which affect shrub survival and reproduction (Kauffman and Martin 1990). Sagebrush is killed by moderate to high intensity fire and does not resprout. Low intensity fire may kill some individuals or groups, creating a patchwork effect (Carro 1992).

5. FISHERIES AND AQUATIC RESOURCES

Native Fauna

It is likely that there were no fish native to the lakes and streams of the drainages west of the Sierra crest. Four native fish species have been observed in the Glen Alpine Creek drainage: Lahontan redside (*Richardsonius egregius*), tui chub (*Gila bicolor*), speckled dace (*Rhinichthys osculus*), and Tahoe sucker (*Catostomus tahoensis*). Lahontan redside and speckled dace have also been observed in lakes in the Meeks Creek drainage. The possible occurrence of non-salmonid fishes has been noted in Granite Lake. All reported occurrences of native non-salmonid fishes have been restricted to drainages flowing into Lake Tahoe. The drainages east of the Sierra crest are within the range of the Lahontan cutthroat trout (*Oncorhynchus clarki*

henshawi), but there has been no indication that Lahontan cutthroats inhabited the Desolation prior to the introduction of hatchery trout.

Other native fauna associated with the streams and lakes within the wilderness includes a variety of amphibians, reptiles, and invertebrates. Recent surveys have identified four species of amphibians; mountain yellow-legged frog (*Rana muscosa*), Pacific chorus frog (*Pseudacris regilla*), California toad (*Bufo boreas*), and long-toed salamander (*Ambystoma macrodactylum*). Two species of riparian dependent snakes have also been observed; western terrestrial (mountain) garter snake (*Thamnophis elegans elegans*) and western aquatic (Sierra) garter snake (*Thamnophis couchii couchii*). The Yosemite toad (*Bufo canorus*) has previously been reported at one locality within the wilderness area. The mountain yellow-legged frog and the Yosemite toad are both California Department of Fish and Game Species of Special Concern as well as Category 2 Candidate Species for listing under the Endangered Species Act.

Mountain yellow-legged frogs have been identified at 42 localities within 14 subdrainages in the Eldorado National Forest portion of the wilderness. They have been found in a variety of ponds, lakes, and streams at low to moderate densities. There is increasing concern over the negative effect of introduced trout on this species. However, trout were present at 18 of the 42 localities, indicating some degree of coexistence. Mountain yellow-legged frog tadpoles require two to three summers to reach metamorphosis and are vulnerable to predation by trout for an extended period. Bradford (1983) suggests that at least 13 feet (4 meters) depth in stillwater habitat is required to assure survival of frogs in substantial numbers during extreme overwinter conditions. However, tadpoles can survive much lower oxygen concentrations than adults and are largely restricted to permanent stillwater, usually deeper than 3.3 feet (1 meter) (Bradford 1963 and 1989). Both frogs and tadpoles were observed at shallower depths in a stream environment following extreme winter conditions (Bradford 1983). From 1993 through 1995, Forest Service and California Department of Fish and Game (CDFG) staff working in the Desolation observed adult frogs and tadpoles in ponds which were shallower than the above depths.

Pacific chorus frogs are common throughout the wilderness area. During a survey of 59 ponds, lakes, and streams in 1993, chorus frogs were found at 45 of the sites. This species is able to utilize ephemeral waterbodies for reproduction as long as water is available to the tadpoles until they metamorphose in late summer at higher elevations. Long-toed salamander larvae were found at 9 of the 59 sites surveyed during 1993. They require permanent deeper ponds that provide the larvae with an aquatic environment during the winter. They most often were found in tannic stained ponds that contained submerged logs. California toads were found at 2 of the 59 sites surveyed during 1993 and have been observed at several other sites within the Wilderness area. As with chorus frogs, toad larvae metamorphose during the summer and do not require water during the winter.

Aquatic invertebrates in the Desolation Wilderness are probably diverse, although surveys have not been made. Water quality sampling of 10 lakes in the wilderness to assess acidification has included zooplankton sampling, although analysis of the zooplankton component has not been completed. Melack et al (1993) reported that seven lakes in the Sierra Nevada, including Lost Lake in the Desolation Wilderness Area, are able to buffer current acidic atmospheric deposition on an annual basis. Zooplankton species known to be intolerant of acidification are present in Lost Lake and species richness was found to be median to the range of values for the seven lakes.

Lake Fisheries

Within the Desolation Wilderness Area, 396 lakes and ponds have been identified from 1:24,000 US. Geological Survey quadrangle maps, encompassing 1,993 acres. Ninety-eight lakes have been aerially stocked beginning in 1950 (Some lakes were initially stocked between 1950 and 1969). One small lake was stocked only in the 1930's, prior to aerial stocking. Two other lakes are known to support trout populations as a result of downstream migration from stocked lakes. Two lakes support trout as a result of unofficial stocking. These 102 lakes range in size from 0.6 to 610 acres and encompass a total of 1,861 acres. Two of these lakes, Rubicon Reservoir and Lake Aloha, are impoundments operated under FERC licenses that experience significant water level fluctuation. The water bodies which are not stocked are primarily small, shallow lakes and ponds that are not known to contain fisheries.

Some Desolation Wilderness Area lakes and streams have been stocked with fish since before the turn of the century. An article in Sunset magazine in the late 1890's describes fly fishing for trout in the lakes of the Glen Alpine Creek drainage; Heather, Half Moon, Gilmore, Susie, and Grass Lakes. "Each of the lakes is kept bountifully stocked by the Fish Commissioners." Black bass were also reported to have been stocked in Gilmore Lake. The first intensive fish stocking effort began in 1925 when the Mount Ralston Fish Planting Club began stocking lakes and streams with trout using pack animals. In the 1940's, the California Department of Fish and Game (CDFG) assumed this responsibility. In 1950, CDFG began stocking trout fingerlings in the wilderness area lakes using a fixed-wing aircraft, a practice which continues today. Stocking has been initiated in six lakes since the designation of the wilderness in October, 1969. Trout fingerlings are most often stocked on an annual or biannual schedule to enhance or substitute for natural recruitment. Trout populations in these lakes are commonly limited by the lack of adequate stream spawning habitat or, in the most accessible areas, by heavy angling pressure. Twenty-seven lakes were last stocked prior to 1985 and are assumed to contain self-sustaining populations or unsuitable overwinter habitat. Angler surveys conducted in 1993 and 1994 reported trout caught in 18 of these lakes. Two of these lakes, Lake Number 9 and Boomerang Lake, were found to contain no fish and support populations of mountain yellow-legged frogs.

Historically, six species of trout have been stocked in Desolation Wilderness lakes: rainbow trout (*Oncorhynchus mykiss*), golden trout (*Oncorhynchus aguabonita*), cutthroat trout (*Oncorhynchus clarki*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and lake trout (*Salvelinus namaycush*). The most common fish species stocked in these lakes has been brook trout, followed by rainbow and golden trout. The trend in recent years has been to reduce the species mix placed in individual lakes, restricting stocking to one species in 70 percent of the lakes stocked from 1980 to 1992. Brown trout have not been stocked since 1975.

Stream Fisheries

In addition to the lakes and ponds, 108 miles of stream channels have been identified within the Desolation Wilderness. This total represents 72 miles of first order streams, 27 miles of second order streams, 7 miles of third order streams, and 2 miles of fourth order streams. Forest Service surveys conducted in the 1970's have identified 5 streams that support trout populations within the Eldorado National Forest portion of the wilderness, covering approximately 16 miles. Rainbow trout were the primary species observed in the lower reaches of most of the streams, typically being replaced with brook trout in the smaller, upper reaches. Approximately 2 miles of Glen Alpine Creek within the wilderness area was surveyed for fish distribution, species

composition, relative abundance, and habitat type during 1992. Brook, brown, and rainbow trout were observed in the stream. All second order and greater streams have the highest potential for supporting fish populations. However, recent visual observations and CDFG surveys have identified fish use of several first order streams. Trout presence in streams is most likely a result of downstream dispersal of fish from stocked lakes and reflective of the species stocked in those lakes.

From 1934 to 1955, streamflow maintenance dams were constructed at the outlets of 23 lakes in the Desolation Wilderness by the Forest Service and CDFG. These small masonry dams were constructed with native rock to provide better year-round fish habitat and stabilize summer streamflows, while blending in with the natural surroundings. The stored water is a part of required minimum releases for downstream water projects on the South Fork of the American River, the Rubicon River, and Glen Alpine Creek. On the Eldorado National Forest portion of the wilderness, CDFG is responsible for regulating and maintaining the dams under special use permits. The Lake Tahoe Basin Management Unit is responsible for the operation and maintenance of the dams on their portion of the wilderness. Many of these dams are presently in various stages of disrepair, from minor disintegration of the masonry structure to loss of function of the flow release valves. One dam, at Heather Lake, has been removed from the inventory of maintained dams and will be allowed to continue to disintegrate by natural processes. Two dams, at Lois and Schmidell Lakes, were repaired by CDFG in 1990 and are currently in excellent condition.

6. WILDLIFE

The California Wildlife Habitat Relationships (WHR) habitat types found in Desolation Wilderness include montane riparian, alpine dwarf shrub, bitterbrush, montane chaparral, wet meadow, sub-alpine conifer, red fir, lodgepole pine, and Sierra mixed conifer (Mayer and Laudenslayer 1988).

There are 189 wildlife species known to occur or suspected to occur in Desolation Wilderness. Of those species, the most common include yellow-bellied marmot (*Marmota flaviventris*), golden-mantled ground squirrel (*Spermophilus lateralis*), various chipmunks (*Tamias spp.*), Steller's jay (*Cyanocitta stelleri*), Clark's nutcracker (*Nucifraga columbiana*), mountain quail (*Oreotyx pictus*), and mountain chickadee (*Parus gambeli*) (USDA Forest Service 1989).

a. Threatened, Endangered, and Proposed Species

Section 7 of the Endangered Species Act (USDI Fish and Wildlife Service 1973) directs federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their habitat.

The USDI Fish and Wildlife Service (USFWS) has provided species lists for the project area (USDI Fish and Wildlife Service, 1-1-94-SP-968, May 19, 1994; UDI Fish and Wildlife Service, 1-1-93-SP-444, March 25, 1993; and USDI Fish and Wildlife Service, 1-1-94-SP-1228, June 16, 1994). An updated project specific species list has been requested from the USFWS. One endangered species, the American peregrine falcon (*Falco peregrinus anatum*), and one threatened species, the bald eagle (*Haliaeetus leucocephalus*), can be found within Desolation Wilderness.

b. Sensitive Species

US. Department of Agriculture Regulations direct the Forest Service to avoid actions which may cause a species to become threatened or endangered (USDA Forest Service Departmental Regulation 9500-4). The Regional Forester identifies a list of species for which species viability is a concern.

Six sensitive species may occur within Desolation Wilderness: northern goshawk (*Accipiter gentilis*), California spotted owl (*Strix occidentalis occidentalis*), great gray owl (*Strix nebulosa*), willow flycatcher (*Empidonax traillii*), Sierra Nevada red fox (*Vulpes vulpes necator*), and marten (*Martes americana*).

c. Management Indicator Species

The Forest Service manages wildlife habitat to maintain existing native and desired non-native species to ensure the continued existence of a species throughout its geographic range (USDA Forest Service Departmental Regulation 9500-4 and FSM 2670.22). Since habitat evaluations of all species of animals is not practical, certain species have been designated as Management Indicator Species (MIS). These MIS represent groups of species with similar habitat requirements.

Meeting habitat needs of selected MIS, therefore, should also provide for viable populations of the remaining species in the group they represent.

The MIS that are not listed as threatened, endangered, or sensitive which occur in Desolation Wilderness include: mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), mallard (*Anas platyrhynchos*), blue grouse (*Dendragapus obscurus*), mountain quail (*Oreortyx pictus*), pileated woodpecker (*Dryocopus pileatus*), and cavity nesting birds.

d. Special Interest Species

Special interest species are animal species for which environmental thresholds have been established in the Lake Tahoe Basin by the Tahoe Regional Planning Agency (TRPA, 1982). Special interest species that are not listed as threatened, endangered, sensitive, or a MIS include golden eagle (*Aquila chrysaetos*), osprey (*Pandion haliaetus*), and waterfowl species. Suitable habitat for mallard (*Anas platyrhynchos*) is present in Desolation Wilderness, therefore, this MIS is used as the indicator for the larger waterfowl species group.

e. Species Discussion

Peregrine Falcon.

Nesting habitat consists of large rock cliffs with vertical faces. In addition, water sources and diverse vegetation types are needed nearby to provide habitat for prey species. Large cliff sites near small lakes exist in Desolation Wilderness. The quality and potential for nest sites has been evaluated for the Eldorado National Forest and the LTBMU and no high quality cliff sites are known to exist within the wilderness boundary (Wilderness Research Institute 1988, 1989).

Peregrine falcons were reintroduced near Emerald Bay, just outside the wilderness boundary in 1990 and 1991. Young falcons were successfully fledged in both years but there have not been any subsequent known active nest sites in Desolation Wilderness. Possible peregrine falcon sightings from the Wrights Lake area, adjacent to the Wilderness, have been reported in recent years. None of these sightings have been verified.

Bald Eagle.

Wintering habitat is generally associated with open water and mature forests with abundant nearby sources of fish or carrion. Suitable wintering habitat is present around Emerald Bay and Fallen Leaf Lake. The Desolation Wilderness does not provide sufficient winter habitat to independently support bald eagles as most lakes freeze over and most do not support adequate fish or waterfowl prey bases. The bald eagles observed in Desolation Wilderness in the late fall and winter are probably foraging opportunistically for carrion and exploring unfrozen lakes. Recent winter populations around Lake Tahoe range from 16 to 20 birds.

Nesting habitat consists of mature coniferous forests with the presence of dominant and co-dominant trees in close proximity to large bodies of water. Bald eagles historically nested in the Lake Tahoe Basin, but no confirmed nesting has occurred since 1971. The Pacific Bald Eagle Recovery Plan (USDI Fish and Wildlife Service 1986) identifies four nesting territories as the goal for Lake Tahoe. The nearest nesting pair occurs on Union Valley Reservoir, approximately nine miles west of the wilderness boundary. Potential nesting habitat does not exist in Desolation Wilderness, but does occur along Lake Tahoe, Emerald Bay, and Fallen Leaf Lake.

Northern Goshawk.

Suitable habitat consists of mixed coniferous and deciduous forest habitat. Nest stands contain large trees, a closed canopy for protection and thermal cover, and open spaces allowing maneuverability below the canopy (USDA Forest Service 1988). Nesting activities typically extend from March through August (USDI Fish and Wildlife Service 1992).

Suitable foraging and nesting habitat occurs in Desolation Wilderness, and several goshawk sightings have been recorded in the southern portion of the Wilderness. Comprehensive surveys for goshawk have not been initiated in Desolation Wilderness. The closest nest site is located 1.5 miles west of the wilderness boundary.

California Spotted Owl.

Suitable habitat consists of mature, multi-level forested stands with canopy closures greater than 70 percent for nesting and greater than 50 percent for foraging (Verner et al. 1992). An abundance of large snags and down logs is also present in suitable owl habitat.

Comprehensive surveys for spotted owls have not been conducted in Desolation Wilderness. There have been unconfirmed sightings of spotted owls near the Meeks

Creek and General Creek drainages, which are trailheads to the northeast portion of the wilderness and in the Pearl Lake area west of the Wilderness. Although suitable spotted owl habitat is scattered across Desolation Wilderness, much of it is in the upper elevation range for this species.

Great Gray Owl.

Suitable habitat consists of mature stands of mixed conifer and red fir forest surrounding meadows typically larger than 20 acres in size (Hurley et al. 1981).

Suitable habitat is present within Desolation Wilderness. There are no verified sightings of great gray owls although comprehensive surveys have not been conducted. Migrating or dispersing individuals may pass through Desolation Wilderness. The closest known populations are found on the Stanislaus National Forest adjacent to Yosemite National Park.

Willow Flycatcher.

Suitable habitat consists of large, open stands of willows or alders in wet meadows and other riparian habitats (Sanders and Flett 1989).

Surveys were conducted in 1992 to the west of the wilderness boundary, with no sightings recorded. Comprehensive surveys have not been conducted within Desolation Wilderness, although suitable nesting habitat exists.

Sierra Nevada Red Fox.

This furbearing mammal is nocturnal and seldom seen. Since trapping of this species was banned in 1974, very little information on the Sierra Nevada red fox has been reported (Steinhart 1990). Preferred foraging habitat is red fir and lodgepole pine forests near openings and meadows (Freel 1991). Rock outcrops, talus slopes, and down logs are necessary for den sites. This species is sensitive to human disturbances including logging, grazing, and recreation activities (Steinhart 1990).

No sightings of Sierra Nevada red fox have been reported in Desolation Wilderness, although suitable habitat is present.

Marten.

Suitable habitat consists of dense (60-100% canopy closure), multi-story, multi-species mature coniferous forests with a high number of large snags and down logs. High-quality habitat is thought to require close proximity to dense riparian corridors used as travelways, and an interspersion of small (less than 1 acre) openings with good ground cover used for foraging (Freel 1991).

Trackplate and camera mount surveys for marten and fisher were conducted in 1992 and 1993 west of the wilderness boundary with no detections. There are, however, numerous sightings of marten in Desolation Wilderness and suitable habitat is present.

Mule Deer.

Mule deer is a MIS representing habitat requirements found in an interspersion of many seral stages including riparian vegetation, meadows, and early- to mid-successional stages of most vegetation types (USDA Forest Service 1988; USDA Forest Service 1988). Deer habitat in Desolation Wilderness consists of fawning and summer range for the Carson River and Pacific herds. Important habitat requirements for fawning include undisturbed meadow and riparian areas that provide hiding cover and succulent forage. Early- to mid-successional forests are used as summer range. Critical summer range and critical fawning areas have been identified within Desolation Wilderness. No major migration corridors occur in the wilderness (CDFG 1983).

Black Bear.

The black bear is a MIS representing habitat requirements found in mature conifer forests interspersed with brush patches and meadows. Bear habitat is composed of conifer forest near meadows, riparian areas, and montane shrub communities. Mature forested habitats with large amounts of dead and down woody material are preferred (USDA Forest Service 1988). Suitable habitat is present, and bears have been observed in Desolation Wilderness.

Mallard.

The mallard is a MIS representing habitat requirements for waterfowl species found in lakes, ponds, marshes, wet meadows, and streams and creeks. Suitable habitat is present and mallards and other waterfowl species have been observed in Desolation Wilderness. The LTBMU LRMP Standards and Guidelines (USDA Forest Service 1988) for waterfowl habitat management require low-level human disturbance from March 1 to June 30.

Blue Grouse.

Blue grouse is a MIS representing habitat requirements found in medium- to large-conifer forests with less than 40 percent canopy closure, interspersed with brush patches and wet meadows. Suitable habitat is present and the species has been observed in Desolation Wilderness.

Mountain Quail.

The mountain quail is a MIS species representing habitat requirements found in open, brushy stands of conifer and deciduous forest and woodland, and chaparral. Quail habitat consists of brushy vegetation interspersed with grass/forb areas. Habitat is often found on steep slopes with thickets for cover (Zeiner et al. 1990). Suitable habitat is present in Desolation Wilderness and the species is frequently observed there.

Pileated Woodpecker.

The pileated woodpecker is a MIS representing habitat requirements for cavity nesting birds found in large mature conifers. Suitable habitat consists of large snags (greater than 24 inches in diameter at breast height (DBH) and 30 feet in height) for nesting. The snags should be within clusters of 4 to 5 mature conifers with at least 40 percent canopy closure (Hurley et al. 1981; USDA Forest Service 1988). There have been no recorded sightings of pileated woodpeckers in Desolation Wilderness, but suitable habitat is present.

Cavity-nesting Birds.

There are several species of cavity nesting birds found in Desolation Wilderness. Since this is a large group, a wide variety of sizes of snags are required to provide for this assemblage. Most of these species utilize snags that are smaller in diameter than those required for pileated woodpecker.

Golden Eagle.

Preferred nesting habitat for golden eagles includes elevated cliff edges (USDA Forest Service 1991). Golden eagles are commonly seen and are believed to nest in Desolation Wilderness, although the exact nest sites are unknown.

Osprey.

Nesting habitat includes open forest with large snags for nest sites, located near open water for foraging (Poole, 1989). Suitable habitat is present and osprey have been observed in Desolation Wilderness but no nest sites are known or suspected. As with the bald eagle, potential nesting habitat occurs around Lake Tahoe, Emerald Bay, and Fallen Leaf Lake.

Table 3-2

Names, listing status and occurrence of wildlife species in the Desolation Wilderness.

Species	Status			Occurrence in the Desolation
	USFWS	FS	State	
Mammals				
Marten		FSS/MIS		observed, habitat exists
Pacific fisher	SC	FSS	CSC	historically present
Sierra Nevada red fox	SC	FSS	ST	habitat exists
Mule deer		MIS		observed, habitat exists
Black bear		MIS		observed, habitat exists
Birds				
Bald eagle	T	MIS	SE	observed, habitat exists
Peregrine falcon	E	MIS	SE	observed, habitat exists
Northern goshawk	SC	FSS/MIS	CSC	observed, habitat exists
Great gray owl		FSS/MIS	SE	habitat exists
Osprey		SIS	CSC	observed, habitat exists
California spotted owl	SC	FSS/MIS	SE	observed, habitat exists
Mountain quail	SC	MIS		observed, habitat exists
Blue grouse		MIS	CSC	observed, habitat exists
Willow flycatcher		FSS/MIS	SE	habitat exists
Cavity nesting birds		MIS		observed, habitat exists
Mallard		MIS/SIS		observed, habitat exists
Pileated woodpecker		MIS	CSC	observed, habitat exists
Golden eagle		SIS		observed, habitat exists
Amphibians/Reptiles (discussed in the Fisheries/Aquatic Resources Section)				
Mountain yellow legged frog	SC		CSC	observed, habitat exists
Yosemite toad	SC		CSC	observed, habitat exists
Mt. Lyell salamander			CSC	habitat exists

Legend

USFWS (United States Fish and Wildlife Service):

- E = Listed as endangered. Species in danger of extinction throughout all or a significant portion of its range.
- T = Listed as threatened. Likely to become endangered within the foreseeable future throughout a significant portion of its range.
- SC = Species of Concern - taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

FS (US Forest Service):

- FSS = Forest Service sensitive species
- MIS = Management Indicator Species for the LTBMU and/or the ELD.
- SIS = Special Interest Species. Identified by the LTBMU and the TRPA.

State:

- ST = Listed as threatened by the State of California
- SE = Listed as endangered by the State of California.
- CSC = A CDFG "Species of Special Concern"

7. VEGETATION

a. Introduction

The diversity of biotic communities in Desolation Wilderness is a result of the climatic and geologic history of the area. Desolation Wilderness contains the northernmost area of extensive alpine habitat along the main Sierra Crest; the summits to the north are mostly forested (Potter 1983). In addition, most of the upper elevations immediately to the north and south of the Wilderness are underlain by tertiary volcanics, while Desolation Wilderness is chiefly granitic. The landscape contains a mixture of upper montane forests and woodlands; subalpine meadows, forests and woodlands; and scattered alpine communities. Glacially scoured terrain, and the associated very open woodlands dominate the wilderness. There is a high frequency of meadows and wetlands in some areas. Continuous upper montane red fir, lodgepole pine and subalpine mountain hemlock forests occur primarily as small patches in the predominantly open landscape.

Impacts to vegetation due to recreation use are localized along trails, corridors and at lake shore camping areas. The riparian vegetation at numerous lake shores has been damaged or eliminated due to long-term visitor use.

The possible occurrence of widespread effects to vegetation due to the exclusion of fire as a natural process and due to changes in air quality have not been documented. However, given the frequency level of the fire regime of the upper montane, subalpine areas of the Desolation Wilderness, it is not likely that the exclusion of fire in the recent past has had a substantial, or any, impact on the vegetation.

b. Vegetation Description

Vegetation in the Desolation Wilderness has been mapped according to potential natural vegetation categories. Potential natural vegetation (PNV) is the basis for ecological classifications of vegetation because it relates plant communities to environmental conditions such as soil type, elevation and aspect. A potential natural plant community, or association, is an assemblage of plant species that would develop and sustain itself in the absence of a major disturbance. The combination of species mix and environment result in different responses to natural and human disturbance and in ecological characteristics such as fire regimes and potential for wildlife habitat. Therefore PNV provides a predictive tool for ecological and management responses. Each plant association in the PNV is given a name based on dominant late successional species and other plant species which indicate specific environmental or management conditions.

The potential natural vegetation inventory for the Desolation Wilderness was based on two publications which describe the vegetation in detail, and on extensive reconnaissance of the area by the mappers. Bruce R. Potter's masters thesis, "A Flora of the Desolation Wilderness El Dorado County, California" divides vegetation into seven physiognomic assemblages. These include forested areas, shrub lands, and meadows. The descriptions are based on existing vegetation, which, in most cases, is the same as potential vegetation since disturbance has been minimal in Desolation Wilderness. Donald A. Potter, USDA Forest Service Zone Ecologist, has produced a draft edition of A Classification of Upper Montane Forests in the Central and Southern Sierras in California, in which he has classified some of the forest communities which occur within Desolation Wilderness.

Potential Natural Vegetation Unit Descriptions:

Descriptions of the vegetation, major ecological characteristics and predicted responses to management activities are listed below. The description titles refer to ecological groups or series. Where the plant associations are known, they are listed below the titles.

Dry and moderate red fir ecological group:

> Includes the following plant associations: RED FIR, RED FIR/PINEMAT MANZANITA, RED FIR/BUSH CHINQUAPIN, RED FIR/DEPAUPERATE.

This group, which is very common throughout the Sierra Nevada, most often occurs on the upper and mid 1/3 of slopes or less often on ridge tops and lower slopes of varying aspects. The stand structure varies from an open overstory with a dense shrub layer of the drier types to a rather dense overstory and sparse understory of the more moderately moist types. These stands may develop irregular structure having open patches of regenerating red fir.

Red fir dominates the overstory and regeneration layers of this type. White fir, western white pine, Jeffrey pine and lodgepole pine are occasional associates. Layering is variable, but 1-3 layers are typical.

Pinemat manzanita or bush chinquapin may occur in the shrub layer of the drier types. Creeping snowberry, sierra gooseberry, or squaw currant may occur in the shrub layer of the moderately moist types.

Common forbs found in the understory are Brewer's golden aster, western penny royal, white veined wintergreen and spotted coral root.

Management implications:

Biodiversity: The plant associations in this group are very common throughout the Sierra Nevada. A relatively low diversity of common plant species are present in these forests. Productivity is moderate to low.

Fire ecology: Small, low intensity burns may happen because lightning occurs frequently but is accompanied by rain at these higher slope positions. Stand replacing fires are unusual under these circumstances (Neill et al. 1992). In the sparser types, low fuel loading and lack of fuel ladders facilitate low fire intensities, sizes and durations.

Suitable uses: Trails may be contoured through stands as long as proper erosion controls are implemented. The forests are not suitable for campsites, stock corrals, and heavy use where landscape is sloped. Sensitivity to wood collection is moderate-high; therefore there is concern about campfires in these areas.

Jeffrey pine and red fir forests:

Includes the following ecotype: RED FIR-JEFFREY PINE/HUCKLEBERRY OAK.

This forest type occurs on ridges and the upper, middle and lower 1/3 portions of slopes and is found on southwest to southeast facing slopes. The stand structure of this type is irregular to open woodland with widely spaced trees. Shrub cover can be prominent to patchy. Conifer regeneration is relatively low, as is the canopy layer diversity. A sparse, single overstory is typical.

Jeffrey pine dominates the overstory with low to moderate cover. White fir, red fir, and lodgepole pine are associated species. White fir and red fir may even dominate the understory and midstory of these sites, but Jeffrey pine are the long term survivors.

Patchy shrub cover is moderate to high, composed of huckleberry oak, greenleaf manzanita, whitethorn, pinemat manzanita, snowbush, bush chinquapin, and/or sagebrush. Herb cover is usually low to moderate between shrub patches. Herb and grass species indicating dry, open sites and shallow rocky soils are present.

Management implications:

Biodiversity: This vegetation type is widespread in the central part of the Sierra Nevada mountains. It contains a moderate diversity of common shrub and herb species. Productivity is very low.

Fire Ecology: This is one of the driest forest types, usually with high shrub cover. Jeffrey pine dominates sites with this vegetation type because it can best survive the more frequent fires that are likely to occur on such sites. After a long time, fire suppression may cause this type to convert to a red fir dominated site.

Suitable uses: Trails may be placed across slopes, but placement would be relatively difficult. These areas would generally be unsuitable for campsites, wood removal, heavy use, and stock corrals due to the slopes and shrub cover. There is a high sensitivity to firewood collection in this type.

Moist red fir and lodgepole pine forests:

Includes the following ecotypes: RED FIR/GRAY'S LOVAGE, RED FIR/LABRADOR TEA, MOIST LODGEPOLE PINE, LODGEPOLE PINE/CAREX EXSERTA (SEDGE), LODGEPOLE PINE/SENECIO TRIANGULARIS (BUTTERWEED), LODGEPOLE PINE/SPIREA, LODGEPOLE PINE/LABRADOR TEA, LODGEPOLE PINE/FESTUCA RUBRA-POA GRACILLIMA (RED FESCUE-ONE SIDED BLUEGRASS).

Most of these stands occur adjacent to meadows on bottomland positions, lower slopes and benches or in higher precipitation zones such as ridge tops, and upper northeast to northwest facing slopes. These forests represent the red fir and lodgepole pine series. The stand structure ranges from dense to moderately dense overstory. Red fir dominates these stands, but western

white pine, lodgepole pine, and mountain hemlock are common associates. These stands are 2-3 layered with a moderate regeneration layer.

The shrub cover of these forests is sparse, characterized by Sierra gooseberry, alpine prickly currant, sticky currant or mountain maple.

Herb cover is low to moderate, composed of species which indicate mesic conditions.

Management implications:

Biodiversity: This series of ecotypes is widespread at higher elevations in the Sierra Nevada mountains. A relatively high diversity of plant species occurs in these forests. *Silene invisa*, currently listed on the sensitive plant list, has been reported to occur on edges of clearings within these stands. Productivity is high.

Fire ecology: Frequent lightning strikes occur, usually with rain, so if fires start they are small and low intensity (Neill et al. 1992).

Suitable uses: Trails may be placed through stands instead of through adjacent meadows. Areas may be used by livestock for grazing and bedding. Campsites may also be placed in areas which are suitable. Generally, these areas should be used with care because at high altitudes, growing seasons are short and soil development is slow. Sensitivity to firewood collection is moderate.

Mountain hemlock subalpine forests:

> Includes the following ecotypes: MOUNTAIN HEMLOCK, MOUNTAIN HEMLOCK/MOUNTAIN HEATHER, MOUNTAIN HEMLOCK/MILKWORT, MOUNTAIN HEMLOCK/MEADOW, MOUNTAIN HEMLOCK/DEPAUPERATE, MOUNTAIN HEMLOCK/ROCK.

These forest stands are restricted to northeast to northwest facing steep slopes in the upper and mid 1/3 slope positions at higher elevations. It also occurs as a dominant species in cold swales above 7,000 feet, and in almost pure open stands on ridge tops.

Stands of steep mountain hemlock ecotype are dense, irregular, two-storied and with little shrub cover. The overstory is dominated by mountain hemlock but western white pine, and red fir are common associates. Conifer regeneration is moderate and dominated by mountain hemlock. In moist areas, willows and mountain alder are associated understory species.

Shrub cover is sparse but represented by mesic site indicators such as Sierra gooseberry, and prickly alpine currant.

Herb cover is also sparse, represented by mesic site indicators such as Brewer's golden aster and Ross' carex.

Management Implications:

Biodiversity: These ecotypes are most common in the central and northern Sierra Nevada Mountains at high elevations. A low diversity of plant species occurs. The productivity of these forest types are generally low.

Fire ecology: Lightning strikes occur frequently with rain at these high slope positions. Fires occur infrequently and are small and low intensity due to moist conditions (Neill et al. 1992).

Suitable uses: Trails may be contoured across slopes if necessary, no other uses are likely since slopes are usually too steep. Erosion should be prevented on steep slopes and fragile meadows since site recovery is slow at high elevations. Firewood collecting has a high sensitivity in this ecotype.

Barren Rock and Lodgepole pine-Western juniper-Jeffrey pine woodland:

> Includes the following ecotypes: (DRY PINE GROUP), JEFFREY PINE-WESTERN JUNIPER/HUCKLEBERRY OAK, LODGEPOLE PINE/HUCKLEBERRY OAK/BARREN ROCK.

This woodland occurs between 7,400 - 9,000 ft. in the most glacially scoured basins. It may also occur on glacially carved ridges, slopes and rock outcrops that may be essentially barren. The stand structure is a sparse woodland of widely scattered lodgepole pine and western juniper trees interrupted by localized patches of montane chaparral and expanses of barren rock.

Shrub cover is patchy and sparse, characterized by huckleberry oak, pinemat manzanita, and sagebrush. In areas of rock outcrop with sparse or absent tree cover, the shrub layer is dominated by huckleberry oak.

Herb cover is also sparse characterized by a variety of dry site species. On a smaller scale, patches of herbaceous vegetation may be considered dry meadows. Common species include sulfur flower, naked stemmed eriogonum, and squirreltail.

Management implications:

Biodiversity: This ecotype is the most extensive type within Desolation Wilderness and also occurs sporadically along the Sierran crest to the north and south of Desolation. The biodiversity of species present is probably moderately high. *Lewisia longipetala* has been reported near Pyramid Peak adjacent to melting snow fields at a very high elevation. Type productivity is very low.

Fire ecology: Fires may start from lightning strikes but would be small in size because of the sparse and discontinuous pattern of the vegetation.

Suitable uses: Trails may be marked across these areas and campsites may be placed where possible. Wood gathering should be prohibited because the limited amount of wood produced is needed to replenish and create soil humus. Site recovery in these areas is slow because conditions are harsh and soil development is very slow. There is, therefore, a very high sensitivity to wood collection.

Western White Pine:

Includes the following ecotype: WESTERN WHITE PINE/ERIOGONUM

The western white pine ecotype is located at higher elevations. Aspects are varied, but the sites are typically located on northeast and northwest facing slopes. Slopes are generally moderate and stands are located on upper and middle one-third slope positions.

Overstory layers are characterized by the presence of western white pine mixed with red fir on better soil conditions. On high elevation, dry granitic slopes, western white pine is the dominant species.

The shrub layer is very sparse or absent, although in some sites greenleaf manzanita or bush chinquapin can occur. Herbs are characterized by dry site indicators.

Management Implications:

Biodiversity: Stands in this type can be quite old and have relative stability in species composition and structure. There is little understory present, and sites are generally of very low productivity.

Fire ecology: Lightning strikes occur frequently with rain at these high slope positions. Fires occur infrequently and are small and low intensity due to sparser vegetative condition.

Suitable Uses: Sensitivity to wood collection is very high. This, combined with the very low productivity, makes these areas very sensitive to camping and camp fires. The older stand structures are not easily regenerated if the area is heavily impacted.

Subalpine Forests:

Includes the following ecotype: WHITEBARK PINE

This treeline conifer grows with red fir, western white pine and lodgepole pine on ridge tops or in pure stands on high elevation cryic soils, or in areas of glacial scouring where soil development is poor.

Management Implications:

Biodiversity: Subalpine forests are found in the Sierra Nevada and Cascade Mountains at high elevations. A low diversity of plant species occurs. However, in some areas, subalpine forbs and graminoids may occur; these are fragile environments. They are very harsh, low productivity sites.

Fire ecology: Fires may start from lightning strikes but would be small in size because of the sparse and discontinuous pattern of the vegetation.

Suitable uses: Trails may be contoured across slopes if necessary. In fragile areas of subalpine forbs and grasses, trails should be avoided. Erosion should be prevented on steep slopes and fragile meadows since site recovery is slow at high elevations. There is a very high sensitivity to firewood collection, which should be avoided.

Wet meadows:

Includes the following ecotypes: WET SHRUB GROUP, WILLOW/RIPARIAN HERB, WILLOW/MEADOW, LARKSPUR/MEADOW, ALDER/RIPARIAN

Wet meadows develop wherever a shallow water table keeps soil permanently wet or saturated throughout the growing season. They are commonly positioned in bottomlands, around springs, lakes or on benches. These meadows remain wet throughout the summer season. They are dominated by sedges, grasses, rushes and sometimes willows and alder. Vegetation cover is dense either in the shrub or herbaceous layer. This series of plant communities is difficult to typify and difficult to stratify by aerial photo interpretation.

Management implications:

Biodiversity: These areas occur throughout the Sierra Nevada mountains. A high diversity of plant species occur in meadows, and species dominance may change during the season from wet meadow taxa to moist meadow taxa as the season progresses. Productivity is generally moderate.

Fire ecology: Generally these areas are too wet to burn.

Suitable uses: Wet meadows are sensitive to compaction and erosion created by trails or heavy use. However, they are productive and may be used for livestock grazing. They have a moderate to high sensitivity to firewood collecting. Often these areas will be impacted by firewood collecting when surrounding areas have low availability of wood. However, their sensitivity and lack of dense tree cover make them unsuitable areas to provide firewood when surrounding areas are not adequate.

Dry meadows:

Includes the following ecotypes: DRY SHRUB GROUP, OCEANSPRAY SHRUB FIELD.

Dry meadows may form wherever tree establishment is discouraged and soils, which are shallow and well drained, are left dry by mid season. This type occurs in areas where snow accumulation is minimal. The dry meadow type is a sparse association of grasses and drought tolerant herbs. The most distinctive dry meadows are those dominated by dense sods of *Carex exserta* forming stair-like terraces on gentle slopes.

Management implications:

Biodiversity: Dry meadows occur throughout the Sierra Nevada mountains and are composed of a low diversity of common plant taxa. Productivity is low to moderate.

Fire ecology: Fires would be small and of low intensity if any ever got started.

Suitable uses: Some grasses may by palatable to livestock, but these meadows would not be large enough or productive enough to be used extensively. Campsites may be established, but ground should not be leveled since soil is shallow. There is a high sensitivity to firewood collection due to the paucity of trees.

Sagebrush steppe:

Includes the following ecotype: SAGEBRUSH-BITTERBRUSH

The sagebrush steppe community is described by Bruce Potter as a compact, tightly spaced shrub land with intermittent openings, supporting mostly drought tolerant, perennial herbs. This unit was mapped on high alpine ridges and plateaus. Low sagebrush dominates these sites and occurs in association with a variety of alpine herbs. This association is well established between 8,000 and 9,200 feet on southern to southeastern facing slopes, ridges and plateaus.

Management implications:

Biodiversity: This plant community occurs throughout the Sierra Nevada mountains at high elevations. A moderate diversity of alpine species exist under these harsh conditions.

Fire ecology: Extensive fires are unlikely to occur since lightning usually happens with rain at such elevations, and vegetation cover is sparse and patchy.

Suitable uses: Trails may be placed along the ridges and plateaus. No other uses are practical since these areas exist under such harsh conditions.

Montane Chaparral:

Montane chaparral is the predominant shrub land, composed of dense thickets of shrubs 0.5 to 6 feet in height. Huckleberry oak, whitethorn and greenleaf manzanita dominate this chaparral. Many other shrub species mix in certain areas. These assemblages inhabit dry boulder fields or other exposed, rocky or well drained slopes where more complex plant communities will not become established.

Management Implications:

Biodiversity: This plant community is common throughout the Sierra Nevada mountains. A large variety of common species occur within these montane chaparrals. Productivity is low in this type.

Fire ecology: Montane chaparral species are affected by the season of fire, level of fuel consumption and the fire intensity, all of which affect shrub survival and reproduction.

Suitable uses: None. Low sensitivity to wood collection, but little wood is available.

Aspen

In the Sierra Nevada, aspen generally occurs above 6,000 feet. Aspects are varied and are not significant in differentiating this type. Slopes are gentle, and stands are found on the lower one-third of slopes and in bottoms or flats, sometimes associated with meadows and riparian complexes. Stands are dense with significantly higher levels of forb and grass cover. Lodgepole pine, red fir, and white fir are occasional associates. Creeping snowberry and alpine prickly currant are occasionally present in shrub layers. Basin sagebrush may be present in drier areas. Stand structures are typically two-storied.

Management Implications:

Biodiversity: Aspen stands are widely distributed in the Sierra Nevada, but stands are small in extent. The associated plant species, particularly forbs and grasses, are diverse, and uncommon species are found. Productivity is moderate to high.

Fire Ecology: Aspens reproduce almost exclusively by root suckers. The initiation of new aspens is prompted by disturbance of the established aspen overstory by cutting, disease, insect outbreaks, or by fire. In some cases, fire suppression has inhibited aspen regeneration; therefore management may require implementation of a natural fire regime.

Suitable Uses: Grazing appears to reduce aspen establishment and regeneration. The species richness and ecosystem diversity provide important wildlife habitat and forage areas. Care should be used to locate trails around these areas. Camping may also disrupt wildlife uses, as would livestock. Sensitivity to firewood collection is also moderate to high.

c. Vegetation of Special Interest

(1) Federally Listed Plants

These include all plant species, subspecies, and varieties classified as either "threatened" or "endangered" by the US. Fish and Wildlife Service under the auspices of the Endangered Species Act. No federally listed plants are known to occur in the Desolation Wilderness.

(2) State Listed Plants

These include all plant species, subspecies, and varieties classified as either "threatened" or "endangered" by the California Fish and Game Commission. No state-listed plants are known to inhabit the Desolation Wilderness.

(3) Sensitive Plants

The phrase `sensitive species' is defined in the Forest Service Manual (FSM 2670.5) as "(t)hose plant and animal species identified by a Regional Forester for which population viability is a concern."

Four sensitive plant species are known to occur in Desolation Wilderness. The common (and scientific) names of these sensitive plant species are: Tahoe draba (*Draba asterophora var. asterophora*), Cup Lake draba (*Draba asterophora var. macrocarpa*), long-petaled lewisia (*Lewisia longipetala*), and hidden-petaled campion (*Silene invisa*). Table 3-3 shows the listing status and the number of known locations for each affected sensitive plant species.

Table 3-3

Names, listing status, and number of locations known to support sensitive plant species in the Desolation Wilderness.

SPECIES	LISTING STATUS			NUMBER OF LOCATIONS
	USFWS	STATE	CNPS	
Tahoe Draba	NL	NL	1B	2*
Cup Lake Draba	SC	NL	1B	2
Long-petaled Lewisia	SC	NL	1B	9
Hidden-petaled Campion	NL	NL	4	2

LEGEND

USFWS	United States Fish and Wildlife Service
CNPS	California Native Plant Society
SC	Species of Concern - taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.
NL	Not listed by State of California as threatened or endangered.
1B	Plants rare, threatened, or endangered in California & elsewhere.
4	Plants of limited distribution - A watch list.
*	One of the two occurrences listed for Tahoe draba in Desolation Wilderness is a historical location for which plants have not been observed or relocated since 1974.

The botanical resources of Desolation Wilderness are relatively well known. Although comprehensive surveys for sensitive plant species in the Desolation have not been conducted (surveys by US Forest Service personnel have been limited to site-specific or habitat-specific surveys in response to proposed projects such as trail construction, or to monitor known occurrences of sensitive plant species), professional and amateur botanists have frequently visited the Wilderness. The resulting plant collections and occurrence records have been documented in A flora of the Tahoe Basin and Neighboring Areas and Supplement (Smith 1984). Smith's book includes specifics on the locations of sensitive plants, and covers not only Desolation Wilderness, but also the entire Lake Tahoe Basin and several neighboring areas. This additional information helps place the rarity of these sensitive plants in a bioregional context.

A Flora of the Desolation Wilderness, El Dorado County, California (Potter 1983) provides additional insight on the flora of the wilderness. Potter's surveys were specific to the wilderness, and resulted in the discovery of new occurrences of long-petaled lewisia and Cup Lake draba. Potter also identified seven plant communities within the wilderness, and contrasted the flora of the wilderness with other documented alpine floras from the Sierra Nevada Mountains.

In 1990 and 1991, portions of the Desolation Wilderness were surveyed for long-petaled lewisia as part of a challenge cost share agreement between the California Native Plant Society and three cooperating FS units (Tahoe National Forest, Eldorado National Forest, and Lake Tahoe Basin Management Unit). The results of these surveys are documented in an interim species management guide produced under that agreement by Anne Halford (USDA Forest Service 1992) and are summarized below.

The two occurences of Cup Lake draba have been monitored three of the past four years. Monitoring of long-petaled lewisia on the LTBMU occurred in 1994. Persistent snow drifts made monitoring impractical in 1995.

The range, distribution, and habitat requirements for each affected sensitive plant species are described below.

Tahoe Draba

Tahoe draba is a species for which an environmental threshold has been established in the Lake Tahoe Basin (Tahoe Regional Planning Agency [TRPA] 1982). The threshold requires a minimum of 5 population sites to be maintained on the LTBMU.

Tahoe draba has a discontinuous distribution from Mt. Rose in Washoe County, Nevada, to Mt. Gibbs near Tioga Pass in Yosemite, California. Four occurrences are known from Mt. Rose at elevations of 8,900 to 10,800 feet. A cluster of four occurrences are known from the Freel/Jobs Sister peaks located near the Eldorado and Alpine County lines at elevations above 9,400 feet. Two occurrences are known from the Desolation Wilderness at elevations above 8,600 feet, one of which has not been relocated since 1974 despite several attempts to do so. The other occurrence was discovered in 1976 near the boundary between the LTBMU and the Eldorado National Forest, in the vicinity of Dicks Peak.The occurrence located near Tioga Pass on Mt. Gibbs at an elevation of 11,500 feet has not been relocated since it was discovered in 1916.

At all of the above locations, Tahoe Draba is found in alpine habitats characterized by scree or talus substrates. The habitat of one Desolation Wilderness occurrence was characterized by Smith (1984) as "moist ledges of metamorphic rock."

The ability of Tahoe draba to tolerate disturbances related to wilderness uses and impacts is not known. Low, tufted perennials (sometimes referred to as pincushion plants) such as the Tahoe draba are typically most susceptible to damage from trampling during and after snowmelt until the plants set seed and become relatively dormant in late August. This plant's preferred habitat is rarely accessed by wilderness users.

Cup Lake Draba

Cup Lake draba is a species for which an environmental threshold has been established in the Lake Tahoe Basin (TRPA 1982). The threshold requires a minimum of 2 population sites to be maintained on the LTBMU.

Cup Lake Draba is known to occur in only two locations, both within Desolation Wilderness. One site is at Saucer Lake on the LTBMU portion of Desolation, and the second site is at Cup Lake on the Eldorado National Forest portion of the wilderness. The occurrence at Saucer Lake

is comprised of three separate plant locations: one on the ridge to the southwest of the lake, one at the outlet of the lake, and one on the north side of the lake along a trail from Echo Lake.

Habitat for this alpine cushion plant consists of "steep, gravelly or rocky slopes" (Potter, 1983) at elevations of 8,400 to 9,235 feet. Baad (1979) described the habitat as "relatively deep soil in the shade of granitic rocks in association with [red mountain heather] *Phyllodoce breweri*, [mountain pride] *Penstemon newberryi*, [elderberry] *Sambucus caerulea*, and [mountain hemlock] *Tsuga mertensiana*." Other observers (Barron, 1992) have also noted the following associates: *Luzula divaricata*, *Chaenactis alpigena*, and *Saxifraga tolmiei*.

The ability of Cup Lake draba to tolerate disturbances related to wilderness uses and impacts is not known. Pincushion plants such as the Tahoe draba are typically most susceptible to damage from trampling during and after snow melt until late August when the plants set seed and become relatively dormant. Existing occurrences of Cup Lake draba show no evidence of decreased vigor due to wilderness use. A user-created trail forms a transect across one large cluster of plants, and the abundance of individual plants does not appear to be affected by infrequent use of the trail. The majority of occupied habitat is unlikely to be traversed by wilderness users.

Hidden-petaled Campion

There are no environmental thresholds established for hidden-petal campion in the Lake Tahoe Basin. The range of hidden-petaled campion consists of a single occurrence in northeastern Trinity County, and a discontinuous band of occurrences from Shasta County south to Stanislaus County. On the Eldorado National Forest, there are 84 known occurrences distributed over the eastern portion of El Dorado and Amador Counties, and the northern portion of Alpine County. On the LTBMU there are four known occurrences. Three occurrences are located in the Desolation Wilderness.

Hidden-petaled campion is a perennial herb that is most commonly found in the ecotone (areas where two communities meet/overlap) between mature red fir forests and riparian communities, or along ephemeral drainages in stands of red fir or lodgepole pine. Less frequently, hidden-petal campion is found growing in the ecotone between red fir forest and montane chaparral. This species is generally restricted to north-facing slopes at elevations between 6,500 feet and 8,800 feet, in areas with mid-day or afternoon shade. Although hidden-petaled campion may be tolerant of some disturbance, studies by Taylor and Palmer (1983) suggest it depends on more stable habitat sites for population maintenance.

Long-petaled Lewisia

Long-petaled Lewisia is a species for which an environmental threshold has been established in the Lake Tahoe Basin (TRPA 1982). The threshold requires a minimum of 2 population sites to be maintained on the LTBMU.

Long-petaled lewisia is endemic (restricted) to the LTBMU, the Eldorado National Forest, and the Tahoe National Forest, from Nevada County in the north, to El Dorado County in the south. A total of 12 occurrences are found within this range, of which 7 are found in Desolation Wilderness. Of the 7 sites in Desolation, three are on the LTBMU portion. Despite extensive surveys in 1990 and 1991 (Halford 1992), only three new occurrences were discovered.

Habitat for the long-petaled lewisia consists of high elevation (above 9,000 feet), leeward slopes or basins where snow frequently accumulates in deep drifts. These snow drifts tend to persist into mid-summer and the runoff produced by this snowmelt provides a specialized habitat suitable for the germination, growth, and reproduction of this perennial herb. Halford (1992) has noted that long-petaled lewisia is frequently found growing in or adjacent to "gravely snowmelt rivulets." Halford also noted that Long-petaled lewisia is found "in cracks of steep (>30% slope) granitic slabs" where snowmelt runoff is accessible.

The ability of the long-petaled lewisia to tolerate disturbances related to wilderness uses and impacts is not known. The life cycle of this plant is such that it is most susceptible to damage from trampling during and immediately after snowmelt until the plant sets seed and becomes relatively dormant in late July or early August. Unlike the drabas discussed above, long-petaled lewisia is not a "pincushion" plant that can be found or physically impacted during any snow-free period of time. Rather, it is a fleshy perennial with leaves that die back every summer leaving only a partly buried stem that is much more immune to physical impacts.

8. HYDROLOGY / WATER QUALITY

The Desolation Wilderness contains the headwaters of the Rubicon and the South Fork of the American rivers, plus a portion of the Truckee River which drains into Lake Tahoe. On the eastern side of the wilderness, several small watersheds drain directly to Lake Tahoe. Two reservoirs and more than 80 major lakes are contained within the wilderness.

Wilderness runoff is dominated by spring snowmelt. Areas from 6,000 to 8,000 feet in elevation are represented by the Canadian life zone and receive 55 to 70 inches of precipitation annually, mostly as snow. Rock outcrops and shallow soils are common in this area. Generally 30 to 50 inches of the annual precipitation received is available as runoff. Areas from 8,000 to 10,000 feet elevation are represented by the Hudsonian and Arctic-alpine life zones. Again, barren rock and shallow soils predominate. Precipitation ranges from 60 to 75 inches annually, mostly in the form of snow with occasional summer thunderstorms. Forty to 60 inches of the precipitation received is available as runoff.

Beneficial uses of streams originating in the Desolation Wilderness include municipal and domestic irrigation, full and non-contact recreation, stock watering, cold and warm-water fisheries, wildlife habitat, and power generation (State Water Resources Control Board, 1991). Beneficial uses of lakes in Desolation Wilderness include full and non-contact recreation, stock watering, cold-water fisheries, wildlife habitat, and power generation.

The water quality at present in lakes and streams appears to be excellent. Monitoring results (US. Environmental Protection Agency [USEPA], 1987; LTBMU, 1989) characterize surface water as generally low in ionic strength, turbidity, and nutrients. Most lakes have exceptional clarity, with secchi depths often exceeding 10 meters. However, generally low alkalinity in these lakes renders them highly susceptible to acidification. Several other watershed attributes, such as bedrock geology, soil types, water flow paths, and hydraulic residence time, influence lake response to acidic inputs. Generally soil coverages in the Desolation Wilderness are minimal, and the lakes have short hydraulic residence times. These lakes are highly sensitive resources, yet at present do not show signs of chronic acidification (USEPA, 1988). However, short-term depressions of pH have been documented, and human-caused episodes of acidification may become more prevalent in the future.

Lake Tahoe Basin hydrologists have studied the water quality of Meeks Creek at the wilderness boundary. The water quality of Meeks Creek as it leaves the Desolation wilderness is excellent. It is generally very low in suspended solids, nutrients and turbidity. Water quality in this stream is very high compared to most other streams in the Tahoe Basin. This stream rarely exceeds applicable State Water Resources Control Board standards for water quality.

Data collected in recent years by the LTBMU shows that turbidity in Meeks Creek has decreased since sampling began in 1980. Suspended sediment values were generally low for this period, and well below state standards. Nutrient values remained low for this period. Dissolved phosphorous annual means ranged from 0.002 to 0.004 mg/l. Total hydrolyzable phosphorus ranged from 0.003 to 0.011 mg/l. Nitrate/nitrite ranged from 0.002 to 0.011 mg/l. Of these nutrient parameters, nitrate/nitrite shows the most variation. This is probably because the dominant source of this nutrient is atmospheric deposition from air pollution sources farther west, and the amount of this material deposited depends on the amount of winter precipitation.

A water quality monitoring plan was developed for the Eldorado portion of the Desolation Wilderness (Kuehn, 1975). Physical parameters including specific conductance, temperature and clarity were measured at twelve selected lakes, and bacteriological (fecal coliform) was measured at 6 lakes. In August, 1993, water samples from three of the same (Maude, Lake of the Woods, and Twin Lakes) and three additional lakes were analyzed for the presence of fecal coliform and fecal streptococcus bacteria. All of the lake basins sustain heavy recreational use, but no grazing had occurred in the basins during the year of sampling. The sampling was not immediately preceded by snowmelt or precipitation. All samples were well within acceptable standards for the pathogens.

E. HUMAN COMPONENTS OF THE ECOSYSTEM

1. HERITAGE RESOURCES

a. Overview

Heritage resources are the remains of human activity which provide a record of past human interaction within the ecosystem. These resources are an important part of our local, regional, and national cultural heritage. They provide invaluable information about our past and are not renewable.

Desolation Wilderness contains evidence of human activity over a long period of time. Artifacts from the Wilderness itself and from the general vicinity indicate that people have been in this area for at least 7,000 to 8,000 years.

By at least 2,000 years ago, large residential base camps and villages were established along the eastern front of the Sierras. The occupants of these villages, usually referred to as the Martis, left remains of hunting equipment in the Desolation Wilderness. Most of the petroglyphs common to the high Sierran regions are attributed to the Martis. Although there are no known petroglyph sites within the Desolation, the potential for rock art exists. Roughly 500 years ago, permanent villages were well established on the western Sierran slopes at elevations generally slightly lower than the annual winter snowline (or below 3500 feet). People from the east side of the Sierra, and possibly inhabitants of the west-side villages, were visiting the wilderness area to procure resources not available in the lower elevations. Archaeological evidence in Desolation Wilderness indicates the presence of large summer camps but no permanent villages.

By late prehistoric times, the Washo (who may be descended from the Martis) were known to have been using the Desolation area fairly extensively. The Washo had their permanent villages east of the Sierra, roughly in the present-day Reno-to-Markleeville area.

Two other groups, the Nisenan Maidu and Northern Sierra Miwok, may have been using the extreme western portions of the wilderness, albeit lightly. Both the Nisenan Maidu and the Miwok maintained their winter villages on the lower western slope of the Sierra. The majority of the Wilderness area was used as a travel corridor for trading or for harvesting food resources not found in lower elevations. The Washo exchanged salt, pinyon nuts, obsidian, and rabbit skins from the east to the Nisenan and Miwok for acorns, soaproot, medicinal plants, yew wood bows, redbud bark for basketry, and modified sea shells (used as currency and as ornaments) from the west.

The Nisenan and Miwok continued their traditional lifeways until the California Gold Rush. The great influx of Euro-Americans in 1849 and the early 1850s had devastating consequences for these peoples. The 1860s Comstock silver strike in Nevada had similar repercussions for the Washo. By the mid-1860s the impacts of disease, violence, environmental degradation, and starvation had severely disrupted conventional activities of the three groups. Many of the descendants of these people continue to live in the vicinity of the Desolation Wilderness.

Historic developments in Desolation Wilderness were closely tied to the Gold Rush in California, the Comstock Silver Rush in Nevada, and the historical use of Lake Tahoe. Early Euro-American activities in Desolation included transportation, dairy farming and livestock

grazing, mining, water conveyance, recreational activities, and logging, all of which have left important remains on the landscape. By the 1850s, a number of heavily used transportation routes for Gold Rush traffic in and out of northern California crossed near the Desolation. These routes (and many of today's hiking trails) generally followed the trails which had been established by the Washo, Nisenan, Miwok, and their predecessors. Dairy products were sold to travelers along these early wagon roads, and dairying became an important industry in the Desolation area by the mid-1850s. During this time, cow camps were established at many of the lusher Desolation lakes; goats and sheep were taken into some of the higher meadows; and a haypress, which compresses grass into hay bales, was established at Haypress Meadows. In 1872, the first cabin was built at Upper Echo Lake, from which two brothers caught and sold muskrat and fox furs and trout to the immigrants traveling on the wagon road through Johnson Pass. In 1875, the first dam was constructed on what is now Lake Aloha, and in 1876, water manipulation continued with the diversion of Echo Lake waters into the South Fork of the American River. Twenty-five lakes in the wilderness have had their outlet streams dammed; ten of these were initially constructed prior to 1945.

The Desolation Wilderness lies midway between the gold-bearing deposits of the Motherlode in California and the silver deposits of the Comstock in Nevada. Prospecting probably began in the Desolation in the 1850s, although the first gold claims were not registered until the 1890s. The early mining claims (14 placer, 8 lode) left no record of mineral production; some evidence of the claims and of prospecting activities should still be visible on the landscape. At least one area mined later (the 1931 Josie claims) left numerous pits and long prospecting trenches in the vicinity of Gilmore Lake. The demands for timber to support mining operations had a greater impact on the Desolation ecosystem than did mining itself. As the Comstock was developed in the 1860s, demands for lumber for construction and for wood to fuel smelters lead to the clearcutting and the widespread depletion of large stands of timber from the Lake Tahoe basin.

Mineral springs in the immediate Desolation vicinity became important attractions by the 1880s for those seeking health benefits. These included Wentworth and Rubicon Springs to the west of Desolation, and Glen Alpine Springs immediately east of the wilderness. Large resort and hotel establishments were constructed at these popular areas, and resort traffic often went into Desolation. The early 1890s also saw a number of resort and tourist attractions being developed around the western shores of Lake Tahoe. In 1896, a boy's summer camp was constructed at Fallen Leaf Lake; this later became known as the Fallen Leaf Lodge. Business competition between Glen Alpine Springs and Fallen Leaf Lodge increased after the turn of the century, and Fallen Leaf Lodge began operating a camp at Lake of the Woods. Each resort also maintained fishing operations at lakes in Desolation Wilderness, including Heather, Susie, Lucille, Grass, Lily, and Gilmore Lakes. Remains of these early resort activities can still be seen in places in the wilderness.

b. Specific Conditions

This longtime use of lands now located within Desolation Wilderness has resulted in archaeological deposits and historic features throughout the area. Since 1980, surveys conducted primarily for trail reconstruction have resulted in archaeological coverage of roughly 740 acres in Desolation, most of this as linear corridors around trails. This is roughly 1 percent of the lands included in Desolation. Large landscapes considered to be archaeologically sensitive remain unsurveyed (estimated at 30 percent to 40 percent of the total wilderness area); it can be expected that additional cultural resources will be encountered on some of this terrain. In

general, areas not usually considered to be sensitive include steep slopes removed from water and large expanses of rock.

Archaeological field investigations and literature reviews have resulted in the location and recording of 74 sites, 22 of them prehistoric (Native American), 48 of them historic (Euro-American), and 4 with mixed prehistoric and historic components. The prehistoric sites range from large, complex temporary campsites showing a wide range of human activities to smaller campsites with a single activity represented. The more complex sites may include middens (soils which have been chemically altered by organic material left by people), lithic deposits (stone tools and the debris from their manufacture), and food processing equipment or facilities like bedrock mortars. Artifacts associated with the prehistoric sites indicate use of the area from at least 4,000 years ago to as late as AD 1860, with a hint of possible earlier use of the area as much as 7,000 years ago.

Field documented historic sites in Desolation include the remains of a late 1800s-era campsite; structural flats which may be associated with the late 1800s operations in Haypress Meadows; the Josie Mining Claims; the remains of Camp Codor, a Boy Scout camp; a resort packer's camp at Lake of the Woods operated by Fallen Leaf Lodge; a standing cabin built in 1945 to support activities on a cattle allotment; and a structure built by the Civilian Conservation Corps to house a compressor used to construct the trail across Mosquito Pass. Historic resources documented from literature reviews include historic dams and water diversion facilities, a historic grave, a WPA camp, 5 cow camps, a shepard's camp, a cheesemaker's camp, 3 collapsed cabin locations and 2 plane wrecks. Additional historic sites can be expected as the archaeological inventory of unsurveyed areas is completed.

Many of the cultural resources in Desolation Wilderness may be found to be eligible for inclusion in the National Register of Historic Places, although none are currently listed. Site integrity and significance have yet to be evaluated for the majority of these sites. Four sites have been evaluated. Three sites are not significant properties and are not eligible for inclusion on the Register. These include the Boy Scout Camp (CA-ELD-688-H), the Fallen Leaf Lodge packer's camp at Lake of the Woods (CA-ELD-689-H), and the CCC compressor structure (CA-ELD-695-H). The buildings or structures at all three were dismantled and removed between the late 1950s and early 1960s. One site, the cabin at China Flat (05-03-55-17), is a significant property and is eligible for the National Register of Historic Places.

Damage and impacts to sites have, however, been noted during site recording. Several sites are being impacted by the annual raising and lowering of lakes, and some sites remain submerged nearly year-round. Other agents of site destruction and degradation include trail construction; grazing and equestrian trampling; rodent burrowing; vandalism; and the creation of unofficial fire pits, trails, and clearing during backcountry recreational camping. Popular modern camping areas are frequently located on or near cultural resources, and some impacts have occurred from backcountry rangers janitorially carrying off historic "trash." Essentially all the sites suffer some minimal impacts resulting primarily from natural causes such as weathering (freeze-thaw) and erosion (sheetwash, snowmelt). Although the nature of these impacts has been identified at the recorded sites in Desolation, the rate of destruction is not known. It can be expected that impacts are occurring on those sites which have yet to be discovered or recorded. It is possible, due to a lack of survey and data on natural effects to sites, that unidentified sites may degrade to a point where they are not recognizable as sites. This situation would cause the loss of data in an area already lacking critical baseline information. Proposed future activities in Desolation Wilderness

also have the potential to directly disturb or destroy cultural resources. These activities include those associated with trail maintenance and construction, watershed restoration, and cattle grazing.

2. RANGE

As early as 1910, Forest records show at least nine allotments located either partially or entirely within the current wilderness boundaries. Many of these allotments have been realigned, combined, or recombined to constitute the five allotments existing today. The existing allotments are located on the Eldorado National Forest. There are no current grazing allotments on that portion of the Desolation administered by the LTBMU. Table 3-4 summarizes the data for the five allotments.

Grazing allotments comprise approximately 39 percent or 25,040 acres of Desolation Wilderness. Portions of three active allotments, Tells Peak, Wrights Lake, and Pyramid are located within the wilderness boundary. The Pearl Lake Allotment recently became vacant. Only the Rockbound Allotment, 10,325 acres, is situated entirely within Desolation Wilderness. See the Grazing Allotments Map at the end of Chapter 2 for allotment locations. In general, livestock grazing begins at lower elevations and proceeds to upper elevations as range becomes ready. Desolation Wilderness is grazed during the late summer.

Rockbound Allotment

The Rockbound Allotment has been vacant since 1988. An April 17, 1990 letter directs the Forest Service to treat vacant allotments as follows: "conduct an environmental analysis (NEPA) and develop an Allotment Management Plan (AMP) which is consistent with the Forest Plan. Prepare an appropriate NEPA documentation and decision. Issue a new permit as appropriate." Rockbound allotment is not currently scheduled for environmental analysis (NEPA) and a new allotment management plan.

Past records indicate that this allotment had heavy grazing use until 1969. Prior to 1959, seven permittees grazed over 500 head of cattle on this allotment. In 1969, grazing numbers had been reduced to 120 cow/calf pairs. In 1979, livestock numbers were further reduced to 110 head which were grazed from August 11 to September 25.

Approximately 17 percent (1,712 acres) of the allotment is considered suitable for grazing. Grazing occurred primarily on moist and wet meadow systems lying within the Rockbound Valley. This valley is surrounded by mountains over 9000 feet in elevation. Access to the allotment is by the Red Peak Stock Trail - a 9200 foot pass near Red Peak, or Rockbound Pass which is slightly lower in elevation. The most recent range condition and trend analysis was completed in 1969. The analysis showed that the allotment was in fair range condition with a stable trend. Soil condition ratings were poor with a downward trend. Range and soil conditions and trend have likely improved since the allotment has been rested since 1988.

Tells Peak Allotment

Approximately 4,323 acres (27 percent) of the Tells Peak Allotment's 15,813 acres are located within Desolation Wilderness. Of the 4,323 acres, 581 acres are considered suitable range. This active allotment permits 160 cow/calf pairs to graze from July 20 to October 5, depending on

range readiness. On or about August 15, approximately 40 pairs are moved to the Roper Meadows-Mud Lake area on the wilderness boundary and remain there for about two weeks, depending on utilization monitoring. On or about October 6, the cattle are moved to the Pearl Lake Allotment.

Range condition and trend analyses for the Tells Peak Allotment have not been completed since 1963. Condition analysis for 1963 ranged from poor to good for the entire allotment. The 1964 Allotment Management Plan indicates that portions of the allotment experienced excessive use by sheep prior to 1932. Between 1937 and 1961, an average of 440 head of cattle grazed in an average grazing season of July 1 to October 15. Currently 160 head graze the Tells Peak Allotment from July 20 to October 10. Because of reductions of livestock numbers and seasons of use, it is likely that range conditions have improved since 1963. Current range and soil conditions are probably fair to good. An environmental analysis is currently scheduled for 2001.

Due to the location of suitable range and the limited grazing period, it is unlikely that grazing and recreation conflicts occur in the wilderness portion of this allotment.

Pearl Lake Allotment

The Pearl Lake Allotment consists of approximately 9,776 acres. About one-third of the allotment is located within the wilderness boundaries. Seven percent (230 acres) of the wilderness portion is considered suitable range. There are no records of range condition or trend analysis for the portion of the allotment within the wilderness. However, the 1963 range condition analysis indicates very poor to fair condition for the allotment. It is likely that conditions have improved due to past reductions of livestock numbers from approximately 300 head in 1957 to 160 head in 1980 and resting of the allotment since the 1992 grazing season. Present range conditions are estimated to be fair to good. An environmental analysis is currently scheduled for 2001.

Wrights Lake Allotment

Approximately 5,540 acres (40 percent) of the Wrights Lake Allotment are within Desolation Wilderness. Less than two percent of the wilderness portion of the allotment is suitable range. Livestock numbers were reduced in 1989 from 365 cow/calf pairs to 312 pairs. The season of use extends from September 1 to October 15. Historically, livestock numbers have decreased on the allotment. Prior to 1962, permitted livestock numbers are estimated at 391. Range condition analyses were conducted in 1992 in the Maude and Gertrude Lake areas. Range condition in these areas has improved considerably from a 1962 rating of very poor to good condition. The improvement in range condition is related to the reduction of livestock numbers in the past and to better management by the permittee. Sixty to 70 cow/calf pairs are herded into the Maude and Gertrude Lake areas to graze for about one month, depending on utilization monitoring. A short fence (approximately 1/8 mile long) is present near Maude Lake and is used as a management tool to prevent livestock drift. Cattle drift into the Lake Sylvia and Lyons Creek portions of the wilderness during the first week of September. Around 70 to 100 cow/calf pairs graze the area from early September to October 1, depending on utilization monitoring. The Wrights Lake Allotment was rested during the 1994 grazing season. The wilderness portion of the allotment was not grazed in 1995 because range readiness criteria were not met due to late snow conditions. An environmental analysis is currently scheduled for 1997.

Recreation and grazing conflicts are likely to exist due to the approximation of suitable range and popular recreation areas at the following locations: Maude Lake, Lake Sylvia, and Gertrude Lake.

The Pyramid Allotment

The Pyramid Allotment is the southernmost allotment within the wilderness. Twenty-one percent (1,604 acres) of the allotment is within Desolation Wilderness. Of this portion, 142 acres are suitable for grazing. Permitted livestock on this allotment are 203 cow/calf pairs which graze from July 7 to October 10, depending on range readiness. No range condition or trend analysis has been completed in the wilderness portion of this allotment. However, the 1962 range analysis for the allotment showed poor to good range conditions on other portions of the allotment. Prior to 1932, an average of 1,300 sheep grazed the allotment (the equivalent of 260 cattle). Since the late 1950s, livestock numbers were reduced to the current permitted numbers. Due to the reduction of livestock numbers since the late 1950s, range condition is estimated to have improved to fair and good conditions.

Cattle drift into the wilderness depending on forage availability and range readiness and graze until they are removed, about the third week of September. The Pyramid allotment was rested in 1995 because range readiness criteria were not met due to late snow conditions. An environmental analysis is currently scheduled for 2003.

Livestock and recreation conflicts are likely due to the approximation of suitable range and the pond southwest of Pyramid Peak.

Table 3-4

Grazing Allotment Summary for the Desolation Wilderness (DW)

Allotment Name	Status	Total acres on Nat. Forest	Acres in DW	Suitable acres in DW	Permitted # animals (cow/calf pairs)*	Total AUMs for allot**	Est. AUMs in DW	Last condition and date (in DW)	Trend	Structures in DW
Rockbound	vacant/ 1988	10,500	10,500	1,712	N/A	N/A	N/A	F/1969	N/A	
Tells Peak	active	15,813	4,323	581	160	549	7	unknown	unknown	none
Pearl Lake	vacant	9,776	3,255	230	N/A	N/A	unknown	unknown	unknown	100' fence
Wrights Lake	active	15,307	5,540	110	312	498	225	G/1993	unknown	1/4 mi. fence
Pyramid	active	5,163	1604	142	203	831	unknown	unk/1963	unknown	1/4 mi. fence

Legend

Condition: P = poor, F = fair, G = good, E = excellent

*This number represents the total number of animals permitted for the whole allotment. Not all of the animals may graze within the Desolation.

**AUM = Animal Unit Month: the amount of forage required by a 1000 pound cow for one month, based upon an average daily forage consumption of 26 pounds of dry matter per day.

3. RECREATION

a. Overview

The unique popularity of the Desolation Wilderness is due to a combination of factors: its proximity to large urban areas (Sacramento, San Francisco Bay area); ease of access via major highways and 13 convenient trailheads; and the influence of both the Lake Tahoe Basin and the Crystal Basin recreation area.

Overall forest-wide recreation use on both the Eldorado and the LTBMU has averaged 3,000,000 recreation visitor days (RVDs) per year over the past five years (an RVD is defined as 12 visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons). The visitation within the Desolation, however, has been increasing annually since 1980 at an average rate of 3 percent a year, with the gain coming from day use. The number of day use permits issued has increased from 4,474 (1980) to 21,037 (1994). While most of this gain is based on actual growth in use, some is due to the installation of self-registration day-use stations at popular trailheads which has improved the compliance rate for day users. During the same period the number of overnight permits issued each year has stabilized in the 7,000 range. Yearly fluctuations in numbers often correspond to changes in snow pack conditions (see Table 3-5).

The Desolation Wilderness is one of the most heavily used wilderness areas for its size. Use in 1994 was estimated at 305,900 recreation visitor days (RVDs) based on wilderness permit data (over 4.6 RVDs/acre). Wilderness permits were first required (for both day and overnight use) in 1971. In 1974, analysis of the permits and an extension of data to account for visitors who did not have permits showed that use totaled 325,000 RVDs for the year (USDA Forest Service, 1978). The 1978 Desolation Wilderness Plan provided for a 15 percent reduction of 1974 use and established a quota system that has limited overnight use since that time. However, there is no limit on the number of day-use permits issued. This explains the continued rise in RVDs towards pre-quota levels while the number of overnight permits remains fairly constant.

Demand for wilderness recreation is expected to continue to grow. The Eldorado LRMP projects that demand for dispersed recreation in Primitive and Semi-Primitive Non-Motorized areas, including Wilderness, will grow by approximately 11 percent in the ten years between 1990 and 2000. This demand will continue to grow at approximately the same rate through 2030.

Table 3-5

Desolation Wilderness Use , 1980 - 1995

Year	Recreation Visitor Days	Overnight Permits	Day Use Permits
1980	202,900	8,471	4,474
1981	212,800	8,591	4,974
1982	224,000	7,436	4,584
1983*	160,300	5,454	3,853
1984	220,679	6,667	4,716
1985	213,000	6,297	5,214
1986	227,500	6,377	5,492
1987	243,500	7,400	5,001
1988	252,000	7,059	8,050
1989	264,900	7,072	12,176
1990	283,200	7,450	13,645
1991	261,300	6,343	15,649
1992	291,000	7,437	15,280
1993	295,000	6,368	22,343
1994	305,900	6,958	21,037
1995*	257,500	5,310	20,858

* Winter snow conditions resulted in an exceptionally short summer use period.

The high use season within the Desolation extends from June through September, depending on weather and snow pack conditions.

Recreation use is concentrated on weekends. Both overnight and day use is concentrated at this time, with backpackers typically entering on Friday or Saturday and leaving on Sunday. Although the overnight quota limits the number of backpackers entering the wilderness to 700 per day, this number is not limiting for the wilderness as a whole. In 1993, the highest number of overnight users to enter the wilderness in one day was 561 (Saturday, September 4). More typically, the number of persons entering the wilderness on high use days is around 400.

Both overnight and day use are concentrated in lake basins of the Desolation which are easily accessible from trailheads. The damage to vegetation and soils is often severe in these areas; trees are scarred, trails are widened, and there are numerous user-created trails. Campsites are large and may contain multiple or over built fire rings, even though wilderness staff have been removing fire rings since the 1990 campfire closure. These areas have increasingly crowded conditions; visitors report encountering an average of 12 and a high of 50 (Eagle Lake) other groups during the course of a day. Opportunities for solitude in such lake basins are frequently minimal.

The more remote and trailless areas of the wilderness are currently lightly used. In these areas, traditional campsites are devegetated and contain fire rings, scarred trees, and user-created trails. However, due to the low levels of use, backpackers may expect to encounter few, if any, other groups in a day.

In order to facilitate comparisons between the alternatives proposed in this DEIS, wilderness staff have compared current conditions in each of the proposed zones to the Opportunity Class descriptions located in Chapter II. Each zone has been given an equivalent rating based on those descriptions. The more remote areas of the wilderness correspond to descriptions for Opportunity Class 2 based primarily on biophysical conditions created by past visitor use. The amount of current use in many of these areas is, however, consistent with use expected in a Class 1 area. Those areas which have very heavy use and/or severe damage to soils and vegetation have been designated as Opportunity Class 5 areas to signify that they exceed the range of conditions desired in the Desolation. The areas which currently exceed wilderness standards include the following: Grouse Lake, the Horsetail Falls/Ropi Lake area, the Tamarack Lake and Lake of the Woods area, Eagle Lake, and Rockbound Lake.

b. Recreational Uses

The primary recreational activities within the wilderness are hiking, camping, and viewing nature. Other common activities include fishing, mountain climbing, sunbathing, horseback riding, and nature study. In descending order (based on permit information), the most popular trailheads for day use are: Eagle Falls, Twin Bridges, Wrights, Glen Alpine, Bayview, Echo, Tallac, Meeks Bay, Lyons, Loon Lake, Ralston, Van Vleck, and Cathedral. For overnight use they are: Echo, Wrights, Eagle Falls, Glen Alpine, Meeks Bay, Twin Bridges, Loon Lake, Bayview, Lyons Creek, Tallac, Ralston, Van Vleck, and Cathedral.

Backpacking/Camping

Favorite camping areas are around the lakes and to a lesser extent the rivers and streams. Most of the camping in the wilderness is fairly short-term--for a week or less.

Permit returns from 1992 and 1993 indicate that overnight use within the Desolation is almost evenly divided among the areas administered by the two Forests. The areas receiving the highest amounts of camping include Lake Aloha (receiving approximately one tenth of the overnight use), Lake of the Woods, Dicks Lake, Gilmore Lake, Middle Velma, Twin Lakes, Lake Schmidell, Lower Velma, Stony Ridge and Maude Lakes. Eagle Lake, with its exceptionally high day use, receives only 2 percent of the wilderness overnight use.

Day hiking

Day-hikers are a significant and growing portion of wilderness users. There are no limits on the number of groups of day hikers that may enter the Desolation. Weekends in particular have a high number of day users. The trailheads along the road encircling Lake Tahoe receive very high day use, as do the Twin Bridges Trailhead at Highway 50 and the trailheads located at Wrights Lake campground. Day users at Eagle Falls, Echo Lake, and Twin Bridges trailheads include casual tourists who enter the Desolation Wilderness for a day hike, a picnic, or even for just an hour.

Figures compiled from day use permits sampled during 1992 and 1993 indicate that almost one quarter of the day use permits issued for the Desolation are issued for those hiking in the Eagle Falls trailhead. Seventeen percent of the day use permits are issued for the Twin Bridges trailhead, 14 percent for the Wrights Lake Trailhead, 11 percent for the Glen Alpine Trailhead and approximately 8 percent for the Bayview, Tallac and Echo trailheads.

Once in the wilderness, day users disperse to a variety of destinations. Permit returns indicate that somewhere between 51 percent and 57 percent of the day use occurs on lands administered by the Lake Tahoe Basin, while 43 percent to 49 percent occurs on the Eldorado. Typically lakes closest to the wilderness boundary receive the most day use. Eagle Lake itself receives around 18 percent of the day use for the whole wilderness. Other areas receiving heavy day use pressure are: Grouse Lake, Twin and Island Lakes, Horsetail Falls, Avalanche Lake, Tamarack Lake, Lake Aloha, Lake of the Woods, Grass and Lily Lakes, Mt. Tallac, Granite Lake, Genevieve Lake, Crag Lake, and the Velmas.

Riding and Pack Stock Use

Horseback riding and the use of pack stock have been activities in the area now included in the Desolation Wilderness for decades. Currently recreational stock use constitutes under 3 percent of wilderness use overall; overnight stock use constitutes under 1 percent of overall use. The trailheads receiving the highest stock use are Van Vleck, Wrights, Echo, Meeks, Loon Lake and Lyons. There are currently no limits on the number of stock that may be brought into the wilderness with each group of visitors. Casual observations of use indicate that stock use for day trips into the Desolation is increasing.

Rock Climbing

Technical rock climbing, involving the use of ropes, mechanical aids, and specific hand and foot techniques, occurs at selected rock cliff faces within the Desolation Wilderness. Rock climbing has become an issue in some wilderness areas due to the increasing popularity of bolted routes. Permanent bolts are installed on such routes through motorized and non-motorized means. The use of motorized drills is prohibited in wilderness, as is the alteration of rock surfaces by gluing or chipping handholds, etc. A policy on bolted routes within wilderness is being formulated at the national level.

There are at least several rock climbing routes in the Desolation, the most popular routes occurring on the east side of the Wilderness. A local climbing guide (Carville) highlights climbing routes within the Desolation in the Eagle Lake area. The guide also lists a climbing area on Maggies Peaks (Eagle Lake area) and at Crag Peaks. One of the routes is described as being bolted. It is also known that there are bolted routes in the Pyramid Creek area and some climbing occurs around Pyramid Peak and Mt. Price. Contacts with local climbers in the past have indicated that some bolts have been placed in the area below Pyramid Peak by one climber. The climbers who were contacted did not know the location or the extent of the bolting, but thought that the routes were seldom used. Wilderness managers estimate that approximately 200 persons use rock climbing routes within the Desolation each year. Most technical rock climbing occurs as a day use activity due to the weight of ropes and climbing gear. The popular routes are located close to trailheads.

Cross-Country Skiing

The Loon Lake area, which borders on the Desolation, is a popular cross-country ski area. Some users from this area venture into the Wilderness for extended day tours or winter camping. The areas of the Desolation accessed through Echo Lake are experiencing increasing winter use, although cross-country ski use and winter use in general are minimal in comparison to summer use. Skiing and snowshoeing constitute under 1 percent of use, based on permit returns. Permit non-compliance in winter is thought to be high, so actual numbers of winter users is higher than that indicated by permit data.

Fishing and Hunting

Approximately 14 percent of the visitors to the Desolation indicate that fishing is a major reason for their trip. An additional 12 percent indicate that they fish while in the wilderness, but that it is not a major reason for their trip (Watson and Daigle 1991). Although sport fishing is permitted from the end of April to mid-November in the streams and all year in the lakes and reservoirs, winter storms and accumulated snow generally limit access to the Desolation until mid-June. Those who fish seek a variety of fishing opportunities, some enjoying lakes which are stocked on a regular basis, others seeking lakes with self-sustaining trout populations.

Approximately 3 percent of the visitors to the Desolation hunt while in the Wilderness (Watson and Daigle 1991). The most popular game animal to be hunted is the deer, but blue grouse and quail may also be hunted. Hunting pressure is light in the interior of the wilderness, primarily due to difficulty of access. The west slopes of the Desolation, however, receive moderate hunting pressure during deer season.

c. Outfitters and Guides

The Lake Tahoe Basin LRMP directs that no new outfitter/guide permits be issued for the Desolation. To comply with the LTBMU direction, neither forest has issued new outfitter/guide permits for the Desolation since 1990. As far back as 1981, the Eldorado's forest policy was to refer new outfitter guides to areas outside the Wilderness. Currently two outfitter/guide operations, Camp Richardson and Cascade Stables, and one camp, Deer Crossing Camp, have permitted operations in the Desolation. The number of service days permitted is not limited. In addition, four camps located near the Desolation Wilderness have historically led groups of camp participants into the Desolation. Table 3-6 summarizes outfitter guide use in the Wilderness.

The two equestrian guides, Camp Richardson and Cascade Stables, lead trips into the wilderness from the Lake Tahoe side. Both are permitted to use all areas on the Lake Tahoe Basin portion of the Wilderness. Cascade stables is under permit to guide trips (for a total of ten trips per year) to the following locations on the Eldorado portion of the Wilderness: Lakes Lois, Schmidell, 4-Q, Highland, Leland, Middle Velma, Phipps, and the portion of Lake Aloha northwest of the junction of the Pacific Crest Trail and 17E40 (from Heather Lake). The stables together have averaged 232 service days per year for the last 5 years.

Deer Crossing Camp, located at Loon Lake, has permitted off-site use for backpacking trips into the Desolation. The camp has averaged 80 service days in the Desolation each year for the last 4

years. Primary campsites are at Rockbound Lake, Rubicon Reservoir, Highland Lake, and Camper Flat.

Three organizational camps (Camp Sacramento, Berkeley Echo Camp and Camp Concord) and one camp located on private property (Stanford Camp) have historically included off-site trips into the Desolation as part of their camp programs. This historic use has included trips which are commercial (trips which meet the definition of a guided trip because they are led by a paid employee) and trips which are non-commercial (trips where camp participants travel into the wilderness without a camp "guide"). Guided activities have occurred in the past 70 years with the knowledge of Forest Service staff. Camp Sacramento, located on the Eldorado National Forest, operates under a Special Use Permit for an organization camp. The camp program includes hikes to areas along Pyramid Creek, both inside and outside the wilderness boundary, which are guided by Camp Sacramento employees. Berkeley Echo Camp employees lead day trips into the Desolation from Echo Lake, Stanford Camp employees lead hikes in the Glen Alpine area, and Camp Concord leads occasional trips to Mt. Tallac. Current Forest Service policy requires that guided trips be included as permitted off-site use in the camps' Special Use Permits. The permits for Camp Sacramento, Berkeley Echo Camp and Camp Concord are not currently amended to include this off-site use. Use by Stanford Camp is not currently under permit.

In 1978, when the overnight quota was initiated, those Desolation visitors using outfitter/guides obtained their own permits. During the period since the 1978 Desolation Wilderness Plan was written, outfitter/guides have been issued permits directly by the Forest Service. Therefore, these trips have not been included in determining when the daily quota for each trailhead has been reached.

In addition to guided trips which are authorized under permit, an undetermined number of unauthorized commercially guided trips occur each year. In 1994, the two forests contacted several groups which were conducting unauthorized commercially guided trips into the wilderness. Some of those groups are now conducting their trips, under permit, elsewhere on the Eldorado.

Table 3-6 Guided Recreation Use Within the Desolation Wilderness

Outfitter/Guide or Camp Name	Allocated Service Days/Yr*	Unallocated Service Days/Yr**	Current 5 Year Avg of Service Days/Yr
Camp Richardson	unlimited	N/A	116
Cascade Stables	unlimited	N/A	116
Deer Crossing Camp	unlimited	N/A	80

The following camps have existing guided use which would require new or updated permits:

Camp Sacramento	unlimited	0	180
Berkeley Echo Camp	unlimited	0	250
Concord Camp	unlimited	0	10
Stanford Camp (private)	unlimited	0	400

* These service days are being shown under allocated days because the permittees write their own permits which are not included in quota ceilings.
**The current camp use is included in this category since camp staff obtain their wilderness permits through the same permit system as the general public.

d. Quotas and Group Size

Permits were first required for entry into the Desolation in 1971. The purpose for the permit requirement was 1) to provide an opportunity to contact wilderness visitors before entry in order to explain the rules for the area and 2) to collect data about use in order to help identify management problems and evaluate solutions. In 1974, a study to determine the optimum use capacity in the wilderness was completed. Wilderness researchers studied the travel patterns of visitors to come up with optimum use levels for each of 13 administrative compartments. Based on the capacity for each compartment, a trailhead quota for overnight use was implemented to assure the total use capacity for the Desolation was not exceeded. At the time that the study was completed, day use was low. The study assumed that campers traveling from one camping site to another during the day would be replaced, in part, by day users. The total Wilderness quota of 700 persons per day was designed to provide an average of 8.3 daily trail encounters with others.

The 1978 quota has remained in effect since that time, however, visitor surveys conducted by Watson and Daigle in 1991 show that travel patterns have changed over the 15 years since the quota was implemented. Day use has increased fourfold. Overnight users take shorter trips (the average length of stay has decreased from 2.9 nights per trip in 1972 to 2.3 nights per trips in

1992) and do not move their campsites as often as was done in the past, resulting in crowded camping conditions at the wilderness lakes closest to the trailhead.

The quotas for the most popular trailheads limit use in the areas accessed by those trails on most summer weekends. For example, the Echo Trailhead is the most popular trailhead for backpackers; with the exception of 2 days, the quota was essentially filled every Friday and Saturday during the 1994 season. In August the quota was also filled on numerous weekdays. Other trailheads, such as Lyons Creek, Twin Bridges, Ralston, Glen Alpine, and Bayview, fill frequently during the summer. The quotas at some trailheads (Buck Island, General Creek, Meeks Bay, Loon and Van Vleck) seldom fill, however, preliminary permit information from 1994 indicates that use at these trailheads is increasing. Trailhead quotas at popular trailheads were reached more frequently in 1994.

Currently the quota is in effect from June 15 through Labor Day. The numbers of people entering popular trailheads on weekends after Labor Day frequently exceed those which would be permitted were the quota in effect at that time. Depending on snow conditions, trailhead quotas may be exceeded at popular trailheads beginning with Memorial Day weekend and continuing on the weekends until the quota takes effect on June 15. Trailhead quota numbers have been exceeded as late in the fall as mid-October.

Permits for overnight use must be obtained from a USFS office year round. During the quota season a reservation system is in effect, and 50 percent of the permits may be reserved up to 90 days in advance. The remaining 50 percent are available on a first-come-first-serve basis. Day use permits are available for self-issuance at most of the heavily used trailheads during the summer months. Day use compliance at these trailheads is mixed. The availability of these permits at the trailhead is a convenience to the public, but the permits are often incompletely filled out, hindering the collection of data for management purposes.

The current group size limit is 15 persons per group. The group size limit is based on research which indicates that large groups impact both visitors' social experience and the biophysical environment to a greater degree than small groups. Data from permits issued in fiscal years 1992 and 1993 indicate that the average group size for both overnight and day use is just over 3 persons per group. In 1993, 47 percent of the overnight permits issued were to groups of 2. Under 2 percent of the overnight permits went to groups of over 10 persons. However, in 1994 wilderness rangers encountered several very large day use groups in the wilderness, particularly at Twin Bridges and Wrights Lake. These groups often did not have a wilderness permit and numbered up to 70 persons per group.

Congress recently passed a pilot program which will allow National forests to charge a visitor use fee. The Desolation Wilderness is one of the areas which is included in the pilot program. The Eldorado and the LTBMU are moving toward implementation of an overnight fee in 1997. The forests are considering reservation fees for wilderness permits and may implement fees on day use in future years. Eighty percent of the funds generated by these fees will be returned to the forests for wilderness maintenance, monitoring, education and administration.

e. Visitor Impacts

Visitors impacts may be either social or biophysical. Social impacts within wilderness are measured as they affect a visitor's wilderness experience or feeling of solitude. Biophysical impacts include effects of visitor use on vegetation, soil compaction and wildlife, etc.

The 1978 Desolation Wilderness Plan recognized impacts due to recreation use of the Desolation. In formulating the quota system, an assessment was made of the effects of travel and camping on solitude, and on vegetation and soils. The limit placed on use was designed to reduce impacts while still providing the wilderness visitor freedom from regulation. Therefore regulations such as camping setbacks and stock regulations were not proposed at that time. The plan stated that most lakes, the river zone and trails were receiving too much use. Solitude was deemed unachievable. Impacts to campsites were described as "traumatic". Since 1978, the only additional constraints placed on use within the wilderness have been the closure on wood fires and the decrease in group size from a maximum of 25 to a maximum of 15.

Biophysical conditions

Between 1982 and 1988, the Desolation Wilderness staff of the Lake Tahoe Basin surveyed 335 campsites at 35 lakes to assess their overall condition. Over the period of the survey, the average condition of the campsites deteriorated. While the condition of campsites in several areas improved slightly, there was a noted deterioration of campsites in the Echo and Glen Alpine areas (Lane, 1990).

In 1992 and 1993, wilderness staff on both Forests inventoried campsites to obtain information on a number of campsite parameters (distance from water, soil exposure, devegetated area, other campsites within view, etc.) The inventory focused on areas of high use such as lake shores, trails and rivers. To date, 1889 campsites have been inventoried. The inventory is estimated to be 75 percent complete. A campsite is defined as a location which is used or has been used for overnight stays within the wilderness.

Thirty-four percent of the campsites inventoried to date are within 25 feet of a lake or creek; 70 percent are within 100 feet of a lake or creek. Of those campsites within 25 feet of water, 44 percent are in meadows or riparian areas. For all sites inventoried, one third are located in sensitive areas.

Forty-six percent of the sites have a campsite area (the area visibly used by campers) between 101 square feet (an area 10' by 10') and 500 square feet (25 feet by 20 feet), while another 29 percent have an area of between 501 and 1,000 square feet. Fourteen percent of the sites have an area of between 1,001 and 2,000 square feet. Seven percent of the sites had a campsite area of over 2,000 square feet (50 feet by 40 feet).

For the wilderness as a whole, an average of 42 percent of each campsite was devegetated. At Eagle Lake (19.9 acre lake), the 16 campsites inventoried had an average of 90 percent devegetated area per campsite. The average devegetated area per campsite was 1,013 square feet. Twelve of the 16 sites were within 100' of the lake shore. Staff inventoried 131 campsites at Lake of the Woods (69.4 acre lake). The average percentage of devegetated ground for these campsites was 59 percent, for a total amount of 123,456 square feet of devegetated ground. The average amount of bare ground per campsite was 564 square feet.

Social trails associated with campsites have been inventoried. Often campsites have one or more social trails associated with them. Other social trails within the wilderness have not been inventoried. Observations by wilderness staff indicate that most lakes are encircled by a user created footpath. Areas where there are numerous worn user-created trails include Horsetail Falls and the area west of Lake of the Woods.

Stock-related Conditions

Many campsites in the Desolation show evidence of years of pack-stock use. Impacts to trees include bark removal and root exposure due to tying stock directly to trees. At areas such as Gilmore Lake, which have been particularly popular with stock users over the years, the basal areas around trees have been hollowed out into donut shaped depressions.

In some areas, riparian vegetation has been damaged due to concentrated stock use at campsites close to lake shores. Campsite inventories have not specifically addressed stock use; however, lakes with larger percentages of overnight stock use tend to have larger campsite areas.

Meadows, trails, and lake shores are particularly sensitive to damage when the ground is saturated after snowmelt. Some areas, such as the Van Vleck area, are getting increasing early season use with resulting soil disturbance and trampling of vegetation adjacent to flooded trails.

Forest archeologists have reported damage to archeological sites from pack animals.

Social Conditions

Social impacts are most commonly assessed by measuring the number of encounters with other groups while traveling and the number of contacts with other campers while camping. Desolation users indicated that they saw an average of 6.9 other groups while traveling in the Desolation. Thirty-two percent saw under 3 other groups, 31 percent saw between 3 and 6 other groups, 20 percent saw between 6 and 10 other groups and 17 percent saw over 10 other groups. Of those users, 10 percent indicated that they would prefer to see no other groups while traveling in the Desolation. An additional 46 percent preferred to see between 1 and 5 other groups, 25 percent preferred to see between 5 and ten other groups and 20 percent would prefer to see over ten other groups (Watson and Daigle 1991).

Those camping within the Desolation indicated an average of one other group camped within site or sound of their camp. Sixty percent of these users indicated that they would prefer to have no other parties camped within sight or sound of their campsite. Another 29 percent indicated that they would prefer to have 1 or 2 other groups camped nearby (Watson, 1991).

f. Recreation-grazing conflicts

On a per acre basis, Desolation Wilderness is one of the most heavily used wilderness areas in the United States. It is easily accessible from major urban areas around the San Francisco Bay, Sacramento, and Lake Tahoe. It is highly scenic, with many lakes which are the primary attractions for wilderness visitors. Lakes are a popular camping destination for backpackers. In addition, day users most often make lakes their destination points. The Desolation Wilderness was so heavily used in the past that the 1978 Desolation Wilderness Management Plan established capacities for recreation use, and limited overnight use through a trailhead quota which reduced use by 15 percent from 1974 levels (USDA Forest Service 1978). Allotment

Management Plans which were in effect before the area was designated as wilderness provided management objectives for each area under grazing permit. An review of those management objectives is provided for each allotment below.

Visitor use in 1978 was primarily overnight use. Day use has increased substantially since that time (see Table 3-5). Day users travel primarily to lakes which are within a couple miles of the wilderness boundary.

There are portions of four grazing allotments (Tells Peak, Pearl Lake, Wrights Lake, and Pyramid) within the Desolation. In addition, one allotment (the Rockbound allotment, vacant since 1988) is located completely within the Desolation. Large expanses of the wilderness are glaciated granite. Therefore, within the wilderness portions of grazing allotments, most suitable range is located around the same lakes that people use. In lake basins with high recreation use, the presence of cattle during the recreation season has led to conflicts between cattle and humans.

Even with proper grazing management, the visual impact of grazed meadows, trampled vegetation, cattle manure in lake waters, the smell and presence of manure and urine around lakes, the noise of cowbells and the presence of cattle in wilderness destinations adversely impact the experience of some wilderness visitors. Visitors have complained to Forest Service staff about the evidence and presence of cattle in the Desolation, particularly in the following lake basins: Maude Lake, Gertrude Lake, Grouse Lake, Lyons Lake and Lake Sylvia. Others have expressed concern that the Rockbound allotment might again be filled, with resulting degradation of the quality of this area for wilderness recreation.

Grazing operations on the National Forests in the Central Sierras are unique in that bells are placed on most of the cattle on allotments. The practice was brought to the area by the Italian-Swiss immigrants who settled the area. Cowbells save permittees time in rounding up cattle. Some wilderness visitors have complained about the noise from cowbells and feel that it is an intrusion on their wilderness experience. Other users have commented that the sound of cowbells in wilderness is pleasant to them.

Rockbound Allotment

The Rockbound Allotment is completely within the Desolation Wilderness. Previous to wilderness designation, this area was part of the Desolation Valley Primitive Area. The 1964 Allotment Management Plan lists the primary land objectives for the allotment area as: 1) Water and watershed protection, and 2) Recreation. The AMP states that the ultimate objective for the area is to continue livestock grazing until cattle and recreational uses are no longer compatible. "In such case the area will be restricted to the higher priority recreational use". The 1964 AMP was the last completed for the area.

Day use in the Rockbound area of the wilderness is low due to its distance from trailheads. Overnight use in this allotment area is lower than in areas closer to the wilderness boundary. Social conditions provide a more remote, pristine experience. Backpackers camp most often at lakes and in streamside meadows located in the allotment. The China Flat and Camper Flat areas have campsites along the Rubicon River, in areas where cattle previously grazed. Popular destination lakes for recreation users which also contain meadow areas for grazing are Lake Schmidell, Lois Lake, and Upper and Lower Doris Lakes. There are currently no

recreation/range conflicts in this allotment since it has been vacant since 1988. Based on wilderness permit returns, day use in the allotment is estimated to be 60 persons per year, while overnight use is approximately 3,000 visitors per year. Visitors accessing this area stay longer due to its remoteness.

Tells Peak Allotment

The 1964 Tells Peak Allotment Management Plan (AMP) lists the management priorities and objectives for this allotment as 1) Water and watershed protection (Intermediate and Crest Zones), and 2) Maximum production of forest products for a sustained yield harvest (Intermediate Zone). Those areas of the allotment which are now within the Desolation were part of the Crest Zone, as delineated on the AMP map. The AMP reviews the correlation of grazing with other uses, stating that "The only heavy recreational use in this particular area is during the hunting season. There are no conflicts between cattle grazing and recreation use." The objectives in the current AMP, completed in 1991, provide for water and watershed protection. Management for recreation has not been an emphasis on this allotment.

Forni Lake and several small, unnamed lakes are the only lakes within the Tells Peak allotment. Cattle graze the area of the allotment which is close to the wilderness boundary at Roper Meadows and do not graze around the lakes. Due to the lack of lakes and trails, recreation use is low and limited to cross-country travel. Based on 1993 overnight use records and 1994 day use records, approximately 141 backpackers and 200 day hikers use this area each year. There are no documented conflicts in this area.

Pearl Lake Allotment

The 1964 Pearl Lake AMP listed the primary land management objectives for the allotment as: 1) Water and watershed protection, and 2) Maximum production of forest products for a sustained yield harvest. The AMP, in correlating with other uses, stated that "there are no present or anticipated conflicts between grazing and recreational uses. The area is generally too remote and the access too poor to get much recreational use - except for occasional fishermen and hunter use." The 1979 AMP provided that the higher elevations would be managed for watershed, recreation and range resources, while the lower elevations would be managed for watershed, timber and range resources. The range management objective listed is to "develop(e) a system of cattle distribution and management for continued grazing consistent with other resources."

Within the wilderness portion of the Pearl Lake allotment, both people and cattle may be present at Lake # 3, Lake # 5, Lake # 9, Lost Lake, Lawrence Lake and Top Lake. In addition, there are several small, unnamed lakes with forage areas. Forage areas are located in the Lake #5, Lawrence Lake, and Lost Lake areas, and from Top Lake to Red Peak. They comprise approximately 138 acres of the 230 suitable acres within the wilderness portion of the allotment. Recreation use at these lakes is approximately 1,200 overnight visitors per year, based on 1993 records. Day use is estimated at approximately 370 visitors per year.

Wrights Lake Allotment

The 1964 Wrights Lake AMP gave the management objectives for that portion of the allotment which is now within wilderness as 1) Water - primary, and 2) Recreation - secondary. The lower elevation portion of the allotment has three management objectives: 1) Water - primary in heavy

snow pack areas, 2) Timber -primary elsewhere, and 3) Wildlife and Grazing - secondary. The AMP states that the allotment will also support a limited amount of grazing. The stated range management objective was to "develop a system of cattle distribution and management consistent with the primary management objectives of the land". The 1979 AMP continued these management objectives.

The Wrights Lake Allotment includes numerous lakes within the wilderness portion of the allotment. Of these lakes, the Maude Lake basin provides 43 acres of suitable forage, the Grouse Lake area provides 8 acres of suitable forage, and the Sylvia Lake basin provides 52 acres of forage. The other lakes within the wilderness portion of this allotment (Gertrude, Tyler, Twin, Island, Boomerang, Umpa, Hemlock, Smith, Secret, and Lyons Lakes) are not part of the calculated forage base for the allotment. Both camping and day use are high at these lakes. The trails in this allotment lead into three separate lake areas. The Maude, Tyler and Gertrude Lakes area is used by approximately 1,450 day users and 2,575 overnight users each year. The Twin, Island and Grouse Lakes area is used by approximately 9,950 day users and 5,300 overnight users, while the Lyons Creek (Sylvia and Lyons Lake) area is used by approximately 1,600 day users and 2,000 overnight users.

Pyramid Allotment

The 1964 AMP for the Pyramid allotment lists the management priorities and objectives for this allotment as 1) Water and watershed protection , and 2) Maximum production of forest products for a sustained yield harvest. The correlation of grazing with other uses states that "This scenic and picturesque area has a rather high recreation potential and several picnic and campground sites are planned in the next 20 years. At present, however, because of the lack of public access, no conflicts exist between grazing and recreation." The 1979 AMP addresses other resource coordination, stating that dispersed recreation use is low due to limited access.

The wilderness portion of the Pyramid Allotment is situated on the high slopes of Pyramid Peak. It contains only one small, unnamed lake. The small lake has 12acres of suitable meadow forage. Other areas of suitable forage are dispersed across the upper ridges of the allotment. Recreation use in this allotment is low by comparison to other allotments; most use occurs on access routes to Pyramid Peak from Lake Sylvia and from the south. Complaints about cattle in this area occur due to concerns about grazing at the small, unnamed lake which is clearly visible from the access route from Lake Sylvia to Pyramid Peak. Based on wilderness permits records, yearly day use in this area is estimated at approximately 400 persons, while overnight use is estimated at 160 persons per year.

g. Wood Fires

A campfire closure was implemented for the Desolation Wilderness in 1990. Wilderness visitors may use portable gas stoves, such as backpacking stoves, or completely enclosed portable camp stoves having chimneys with spark arresters.

The closure was based on campsite surveys of 335 campsites conducted on the Lake Tahoe Basin portion of the Desolation Wilderness over a period of 6 years. Between the first and last years of the survey, the campsites surveyed showed a general downward trend in condition. The most severe campsite impacts were judged to be due to the construction and maintenance of campfires. Campfire rings were large, with some up to three to four feet in diameter. In addition,

many campsites had multiple fire rings within the same site. Campfire rings frequently became garbage receptacles. The burning of wood in these campfires resulted in the removal of vegetation and damage to live trees. These impacts compromised the primitive setting appropriate for wilderness.

In 1992 and 1993, wilderness staff inventoried 1900 campsites within the Desolation. Most of the campsites inventoried were located near lakes, rivers or along trails. The inventories included an estimate of the available firewood to sustain campfires. The dead and down wood of good burning quality within 300 feet of each campsite was inventoried. If there was enough wood of such quality that collecting wood for several large campfires would not noticeably reduce the amount available, the site was rated as having "abundant" firewood. If the collection of wood for several large campfires was possible, but noticeably depleted the amount available, the amount was considered "moderate". Firewood was considered "scarce" at campsites where there was not enough wood for several large campfires within 300' of the campsite.

Firewood was scarce at 1499 (80%) of the campsites surveyed. There were 339 (18%) campsites where the amount of firewood was considered moderate. Fifty-two (3%) campsites were considered to have abundant firewood. Campsites with abundant firewood were not generally located at lakes, but along trails in lesser used areas. Those lakes where firewood availability was generally moderate were typically in lesser used, more remote areas in the northwest portion of the Desolation.

h. Dogs

The 1978 Desolation Wilderness Plan directed that dogs would be under the control of their owners. Although not a regulation, this direction has been carried forward in educational messages by wilderness rangers, in brochures and on trailhead signing. Public concerns about disturbance of visitors and wildlife led to this direction. Despite the messages provided for the public, few dogs are under direct physical control. Approximately 16.5 percent of wilderness visitors bring dogs into the wilderness, while approximately 20 percent of wilderness visitors consider dogs a problem (Watson and Daigle, 1991). Visitors to the Desolation are evenly split in desiring a leash requirement. Of the visitors surveyed by Watson and Daigle (1991), 39.4 percent believed that a leash requirement was desirable, while 37.9 percent believed that such a requirement was undesirable. Twenty-two percent were neutral. In comparison, 51 percent believed that closing the area to dogs was undesirable, while 26 percent felt that such a closure was desirable. There are few reported cases of dogs chasing wildlife within the wilderness.

Although there is no regulation requiring physical control of dogs in the Desolation, El Dorado County does have an ordinance requiring that animals (excepting livestock on open range) not enclosed on private property be confined by a leash of not more than 10 feet in length (County Ordinance 6.12.070 Running at large prohibited). Any animal not so confined may be taken to animal control by any person.

In 1991, Eldorado National Forest administrators issued a special order to require that dogs be on a leash in the Carson Pass area of the Mokelumne Wilderness. This regulation was implemented due to visitor safety issues in a heavily used portion of the wilderness. Several other wilderness areas in California have leash requirements for dogs.

i. Recreational Shooting

A small percentage of Desolation users engage in the recreational shooting of firearms. This use occurs sporadically throughout the wilderness. Recreational shooting was listed as a concern in the 1978 Plan, which indicated a perceived decline in the numbers of non-game species, particularly marmots. The planners stated that there was some evidence that the increase in casual shooting that was occurring was "at least partially responsible for the declining non-game species". (Marmots may be hunted legally in California.) There is no documentation in the plan of the evidence cited. The issue of visitor safety was also discussed.

Visitor disturbance by recreational shooting continues to be a concern, particularly in heavily used areas such as the northern Rockbound Valley and Desolation Valley. Watson and Daigle (1991) report that approximately 10 percent of the visitors to the Desolation consider recreational shooting to be a problem. Their 1991 survey indicated that 81 percent of the visitors to the Desolation would prefer to limit the use of firearms within the wilderness to hunting.

There is incidental evidence that shooting of non-game species such as marmots occurs, but no direct information on how frequently it occurs.

4. NOISE

Increasingly, assessments of wilderness conditions include the noise environment. A mandate of the 1964 Wilderness Act established that wilderness areas would provide visitors opportunities for solitude. It has been recognized that an individual's perception of solitude and evaluation of their recreation experience are influenced by the noise environment.

In a wilderness context, ambient (non-indigenous) noise sources are joined by the sounds of hikers and campers, aircraft Over-flights, migrating flocks of birds, winter avalanche blasting to the east of the wilderness and, occasionally, distant motorized equipment or surface transportation. These noise levels within the Desolation Wilderness are addressed under the environmental thresholds established for the Tahoe Basin portion under the LTBMU Forest Plan and those adopted for the wilderness by the Tahoe Regional Planning Agency. Noise environments were not addressed in the ENF Forest Plan.

Noise thresholds established for the Desolation are 25 decibels (dbA) for cumulative noise event levels (CNELs). A CNEL is a sound value of the "average" sound levels for a specific time interval with a weight factor incorporated to penalize sounds which occur during evening or nighttime hours. Since wilderness or community noises tend to vary with time, it is necessary to use an average value. Although these noise thresholds were adopted, actual monitoring within the Desolation in 1982 and 1991 resulted in CNEL levels exceeding 40 decibels, suggesting the adopted value of 25 dbA is unrealistic for wilderness areas. Extensive sound level measurement data for isolated areas managed by the National Park Service apply a CNEL standard that ranges from 40 to 45 dbA.

5. AIRCRAFT OVER-FLIGHTS

The Federal Aviation Administration currently publishes an advisory, "Visual Flight Rules (VFR) Near Noise-Sensitive Areas" which applies to wilderness areas, including the Desolation. This advisory directs pilots operating under VFR to "make every effort possible to fly not less

than 2,000 feet above the surface, weather permitting..." The surface of a National Park area (including wilderness) is defined as the highest terrain within 2,000 feet laterally of the route of flight or the upper-most rim of a canyon or valley. Avoidance of noise-sensitive areas is preferred. There is no penalty for violation of this advisory. FAA regulations do mandate a 1,000 foot minimum ceiling over areas where persons and/or structures are present within a 2,000 foot lateral radius.

The Desolation is located on the flight path from the Lake Tahoe Airport. Large commercial flights frequently gain altitude as they fly over portions of the Desolation. In addition, occasional military flights occur at low altitudes. Non-commercial aircraft are frequent violators of the 2,000 advisory. Approximately 20 percent of Desolation's visitors feel that low-flying aircraft are a problem (Watson, 1991).

6. NON-CONFORMING USES

In addition to the 22 streamflow maintenance dams, two dams which are part of Federal Energy Regulatory Commission (FERC) hydroelectric projects exist in the Desolation. Lake Aloha is operated by Pacific Gas and Electric Company, and the Rubicon Reservoir is operated by the Sacramento Municipal Utility District. These facilities predate the wilderness and are managed in a manner consistent with the management of the surrounding wilderness.

The Natural Resources Conservation Service has two snow survey courses located within the Desolation, one at Echo Peak and one at Lake Lucille. These two sites are serviced twice a year by helicopter. An additional four snow survey aerial markers are no longer used and are being dismantled by the Sacramento Municipal Utility District (Lake #3, Rockbound Valley, Lake. Lois, and Lyons Lake.).

The Lake Lois snow pillow is authorized under Special Use Permit to the California Department of Water Resources. The snow pillow was installed in the 1980's for use in determining water content of the snow pack for water runoff predictions. The Special Use Permit under which the snow pillow is operated is currently under review and consolidation in a separate Regional environmental analysis.

7. TRAILS AND TRAILHEADS

At present there are approximately 123 miles of trails within the Desolation Wilderness: 74 miles on the Eldorado portion, and 49 miles on the LTBMU. The Pacific Crest Trail (PCT) runs north-south through the wilderness and covers 23 miles. In addition to the PCT, the Tahoe Rim Trail, a locally designated trail being completed to encircle Lake Tahoe, makes use of the 23 miles of the PCT within the Desolation. The Rim trail attracts many day hikers to those portions of the wilderness accessed by the trail. Table 3-7 summarizes the trail miles.

In addition to interior wilderness trails, the Forests maintain access trails which lead from trailheads to the wilderness boundary. Twenty-two miles of the non-wilderness trails on the ENF and 13 miles of the non-wilderness trails on the LTBMU provide access to the Desolation. Several of the access trails, such as the nationally known Barrett Lake and the Rubicon Jeep Trails, are open to motorized traffic. In addition, most access trails are open to mountain bike use. Trails inside the wilderness, however, are only open to foot and pack animal traffic. Some trespass into the wilderness by bicycles and motorcycles occurs each year, primarily on the

Pacific Crest Trail at the northern wilderness boundary and at the Rubicon Trail near the Rubicon Jeep Trail or during the off season when visitor use is low and wilderness patrols no longer occur.

Table 3-7

Summary of trail miles

Administrative Unit	Miles of trail in the Desolation	Miles of non-wilderness trail
Lake Tahoe Basin MU	49	175
Pacific RD (ENF)	72	43
Placerville RD (ENF)	2	31
Total	123	249

Of the 158 miles of wilderness and wilderness access trails, the 1978 plan provided that 94 miles would be maintained to hiking standards, and 64 miles would be maintained to standards for use by pack and saddle stock. The primary trails to be maintained to standards for pack and saddle stock include the PCT, and the Rubicon, Rockbound, and Meeks Bay trails.

Of the 123 miles of trail within the Desolation, approximately 30 miles are maintained to a standard of "easy", 74 miles are maintained to "moderate" standards, and 14 miles to "difficult" standards. Five miles of trail are not maintained to standard.

Paved trailhead parking is provided at the most popular entry points. Trailheads with dirt roads, maintained or unmaintained, are rarely used. Eagle Falls, Wrights Lake, and Echo Lake are the three most popular trailheads. Cathedral, Van Vleck, Ralston, General Creek, and Buck Island receive the least use. Table 3-8 lists the trailheads and the facilities available at each.

Table 3-8

Desolation Wilderness Trailhead Facilities

TRAILHEAD	ADMIN #	BATHROOM #/TYPE	INFO BOARD	SELF-REGISTER	PARKING SPACES	PAVED ACCESS	TRASH PICK UP
Eldorado NF							
Loon Lake	01	2 VAULT	YES	YES	40 PAVED	YES	YES
Van Vleck	02	NONE	NO	NO	30 DIRT	YES	NO
Wrights Lake	03						
Rockbound		YES	YES	YES	47 PAVED	YES	YES
Twin Lakes		YES	YES	YES	25 DIRT	YES	YES
Mdw Overflow		YES	YES	YES	75 DIRT	YES	YES
Lyons	04	NONE	YES	NO	30 DIRT	YES	YES
Twin Bridges	05	NONE	YES	YES	40+ DIRT*	YES	NO
Ralston	06	NONE	NO	NO	10 DIRT	NO 1/4	NO
Buck Island	15	NONE	NO	NO	4WD ONLY	NO 6	NO
LTBMU							
Echo Lake	07	4 PORTA	YES	YES	100 PAVED	YES	NO
Glen Alpine	08	2 VAULT	YES	YES	40 PAVED	YES	YES
Cathedral	09	NONE	NO	NO	NONE	NO	NO
Tallac	10	NONE	YES	YES	20 PAVED	YES	NO
Bayview	11	4 PORTA	YES	YES	20 PAVED	YES	YES
Eagle Falls	12	2 VAULT	YES	YES	36 PAVED	YES	YES
Meek's Bay	13	NONE	YES	YES	25 DIRT	YES	NO
General Creek	14	NONE	NO	NO	5 DIRT	YES	NO

TABLE KEY

Bathrooms: PORTA = portable toilets, VAULT = permanent vault toilet structure. The number designates the number of stalls. These toilets are located at the trailhead or are associated with a campground and are within 200 yards of the trailhead.

Info Board: Informational bulletin boards at the trailhead.

Self-register: Self-registration box for self issuance of wilderness permits.

Parking Spaces: Paved spaces are usually clearly defined; the number of dirt spaces available is a more subjective figure. * At Twin Bridges additional cars parking double and along highway can bring the total to 100 on peak weekend days. ** At Eagle Falls, additional cars park along the highway and in turnouts.

Paved Access: If the access route is dirt, the miles of unpaved access to the trailhead are indicated.

Trash Pick-up: Trash dumpsters provided at the trailhead or at the co-located campground.

8. SOCIOECONOMIC

a. Local Socioeconomic Factors

The Desolation Wilderness is located approximately 90 miles east of Sacramento, California, and is entirely within El Dorado County. The county is bisected by US Highway 50, which runs east-west and connects the San Francisco and Sacramento metropolitan areas with South Lake Tahoe. On the east, Highway 89 provides access to the wilderness from South Lake Tahoe. Both highways are popular tourist routes.

The county's economic base includes tourism, recreation, lumber and wood products, and agriculture. Summer recreation and tourism sectors are based on the county's lakes, rivers, mountains, and historic sites. Winter tourism is based on ski hills and snow play areas. The areas within the county most likely to be affected economically by changes in the management of the Desolation include the cities of South Lake Tahoe and Placerville, and the unincorporated communities near the Desolation along Highway 50 and Highway 89.

b. Economic Efficiency

Current costs to the Forest Service include annual costs for Wilderness patrol, education, law enforcement, monitoring, trail maintenance, wilderness permit administration, range allotment administration, and fire suppression; and non-recurring costs for wilderness planning and trail re-construction. Revenues to the Forest Service are generated through commercial use of the wilderness. Revenues include monies generated by cattle grazing. Revenues are also generated through outfitter/guide use of the Desolation. Due to the high accessibility of the area and the corresponding high public demand for use, outfitter/guide use within the Desolation is minimal.

c. Local Demographics

According to 1990 Federal Census data, El Dorado County is the seventh fastest growing county in California. The total population nearly doubled between 1970 and 1980, then doubled again by 1990. The population is expected to increase at a similar pace, and is projected to be 210,000 by the year 2000. The population growth has been concentrated in the western and far eastern portions of the county. The growth in the western portion of the county includes the towns of Placerville, El Dorado Hills, and Cameron Park. The eastern portion has growth centered around South Lake Tahoe. The 1990 Census data shows that the population of El Dorado County is predominantly white (89.7%), with Hispanics (7.0%), African Americans, Native Americans, and other minorities comprising the balance.

The labor force of El Dorado County has grown steadily since the 1970s, primarily due to the increase in two-income families. Unemployment rates have declined over the same period. Per capita income for county residents increased 85 percent from 1980 to 1990. Per capita income within the county is at 93 percent of the statewide per capita income level (El Dorado County Chamber of Commerce, 1994).

d. Revenues to State and Local Economies

The major administrative sites for the Desolation Wilderness are located at the Eldorado National Forest Supervisor's Office in Placerville, the Pacific Ranger Station in Pollock Pines, the Lake Tahoe Basin Management Unit in South Lake Tahoe, and the Eldorado N.F. Visitor

Center in Camino. These facilities provide direct employment to a number of county residents and also contribute to the county's economic base by the indirect employment that they provide.

In 1993 the cost of managing the Desolation was $294,000. These amount included costs associated with preparation of revised management guidelines for the Desolation. The ENF and the LTBMU had 9 temporary field staff patrolling in the Desolation. In addition, wilderness funds contributed to the salaries of information office personnel and forest administrative staff, and contributed to rents, contracts, payments, and the purchase of materials and supplies.

Use of the Desolation comprises a small percentage of the total recreation use that occurs within the County. Visits to the Desolation accounted for 1.5 percent of the total visits to the LTBMU and 1 percent of the total visits to the ENF in 1994.

Tourism is a major component of El Dorado County's economy. In 1989, travel related expenditures totaled $341,000,000. (El Dorado County Chamber of Commerce, 1994) Wilderness users contribute to this industry to varying degrees. Visitors from nearby urban areas typically purchase supplies before leaving their area of residence while visitors from more distant areas may purchase supplies locally. Based on 1993 visitor use levels for the Desolation, and based on estimates of typical expenditures made by wilderness users, Desolation visitors spend approximately $1,060,000 annually in the county.

Recreation use of wilderness does not generate any revenues for the Forest Service. Unless Congress grants the Forest Service the authority to charge a user fee, this situation will remain unchanged. Some revenues are generated through permits for grazing allotments and outfitter-guiding.

e. Social Environment

Groups which are affected by management of the Desolation include local residents, local businesses, commercial users (outfitter-guides and range permittees), non-users for whom the existence and condition of wilderness is important, and wilderness users (both day hikers and overnight users). Recreation opportunities are discussed in more detail in the Recreation portion of this chapter.

Local residents include those who have homes which are close to the wilderness boundary and those who have recreation residences on National Forest lands in the Wrights Lake, American River Canyon, Echo Lake, and Lake Tahoe areas. These residents are concerned with recreational values and ease of access to wilderness. They are typically concerned about the danger of wildfires in their areas. Local residents may also be affected by increased visitation and traffic, changes to local purchasing, and potential for local employment.

The commercial uses of wilderness are limited to cattle grazing and outfitter/guiding. Wilderness use makes up 5 percent of Camp Richardson's business and 3 percent of Cascade Stables' business. Approximately 10 percent of Deer Crossing Camp's use occurs within the Desolation. Outfitter/guides are concerned about the effects of management decisions on their ability to run profitable operations. Additional guide services and camps have requested the opportunity to obtain permits to offer services within the Desolation for a range of activities from day hikes to winter mountaineering. Wilderness staff have documented unauthorized commercial trips within the Desolation, however, the total extent of such activity is unknown.

Range permittees on the Eldorado N.F. are dependent on National Forest lands for approximately 12% of their forage needs. The percentage of suitable range lying inside the wilderness boundary determines what portion of the permittee's operation is affected by wilderness management decisions and what costs might be accrued. Range permittees are concerned with the effects of recreation use and wilderness management on their operations. Utilization of these allotments has been part of the family heritage for several of these permittees.

The Rockbound, Pearl Lake and Tells Allotment were all operated by one permittee until recently. In 1988 that permittee did not re-apply for the Rockbound Allotment and recommended that it be closed. Cattle on the Rockbound Allotment must be monitored and herded on a daily basis to prevent over-grazing and damage to sensitive areas. In the past, the allotment, due to its location, has been operated in conjunction with one of the adjoining allotments. The allotment has been judged in the past to be marginally economically feasible at best, and has been vacant since 1988.

Non-users of the Desolation, for whom its existence and preservation as wilderness is important, comprise a broad constituency. These people include members of environmental organizations which have been at the forefront of the wilderness movement. The protection of biological diversity and natural ecosystem conditions within the wilderness are important to this group. Some members of this group desire the continued stocking of fish not indigenous to the Desolation; others view such fish stocking as an artificial infringement on natural biodiversity conditions.

f. Desolation Wilderness User Profile.

Visitors to the Desolation can be broadly divided into two groups; day users and overnight users. Many of these users are individuals and family groups. A portion of the users are organized groups such as Boy Scouts, church groups, and clubs.

In 1991 Allan Watson and John Daigle of the USFS Intermountain Research Station performed a survey of visitor trends in Desolation Wilderness. The survey was based on a sample of 637 questionnaires from Desolation visitors. Of those surveyed, 37 percent of the day users and 28 percent of the overnight users had not been to the Desolation previously.

Over half of the visitors to the Desolation are from cities with a population of 50,000 or more. Approximately 14 percent are from small towns and rural areas. Most are from California; 12 percent are from local areas to the east and west of the Desolation. Twenty-seven percent are from the greater Sacramento area and 45 percent are from cities in the San Francisco Bay area. Less than 14 percent are from out of state.

Visitors span all age groups; however the two largest groups are 25-34 and 35-44. Contrary to some popular opinions, young adults are not the main users of wilderness areas. The average age of both day users and overnight users has increased since 1972 when such a survey was last completed. The average age for day users has risen from 39 to 40 years while the average age for overnight users has increased from 30 to 36 years. Approximately 30 percent of all wilderness users are female. Ethnic minorities make up almost 10 percent of the visitors to the Desolation (Watson and Daigle, 1991). Use by the handicapped community is estimated to be under 1 percent.

Watson and Daigle found that one third of the visitors indicate that they belong to organizations which are primarily concerned with conservation or outdoor recreation. Of these, 27 percent belong to wilderness oriented organizations, 27 percent belong to resource conservation organizations, 23 percent belong to both of the above, 4 percent belong to youth clubs, and 34 percent belong to other resource oriented organizations. Organized club and school outings make up under 4 percent of the groups visiting the Desolation; 87 percent of the groups using the Desolation are family and/or friends traveling together.

Different user groups may, as a whole, have different expectations of wilderness. Day users comprise a wide variety of wilderness visitors with different interests. These users include families, individuals, organized groups, hikers, equestrians, fishermen, hunters and cross-country skiers. These activities are more fully described in the recreation section. Day users are typically less concerned about solitude (Watson, 1993). Chilman's (1989) survey of visitors to Eagle Lake indicated that many visitors experienced solitude on a day when 696 people traveled the trail in an 11 hour period. These visitors are often more concerned with easy access, spontaneity, and swimming and fishing opportunities. They often want more trails and more signing.

Overnight users also have varied interests. Generally, they are more experienced wilderness users and more desirous of solitude and primitive conditions. Many experienced backpackers and day users have been displaced by the heavy use and crowded conditions in the Desolation. Such users travel to wilderness areas with less people or enter the Desolation during the late fall, winter and spring when use is low.

Organizational groups, including the Boy Scouts, church groups, and the Sierra Club, tend to have group sizes of over ten. In 1993, overall use by groups larger than 10 constituted under 2 percent of the use in the Desolation. During the 1994 summer season, staff issuing overnight permits have noticed a marked increase in use by the Boy Scouts. Members of such organizational groups may be concerned about changes in group size restrictions and changes in the ease of obtaining permits.

Chapter 4

ENVIRONMENTAL CONSEQUENCES

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

A. NATURAL COMPONENTS OF THE ECOSYSTEM

1. SOILS

Possible effects of management alternatives upon the soil resource within Desolation Wilderness have been assessed in terms of overall soil health, productivity, and ecosystem function. The Draft Soil Quality Standards which have been developed for Region 5 (FSH 2509.18 Section 2) are not mandatory for application in the Desolation Wilderness because wilderness is a "dedicated use". However, the guideline's general concepts regarding soil productivity, hydrologic function, and environmental health provide the necessary foundation for determining overall soil quality and corresponding consequences of management.

Alternative 1

Implementing this alternative will have the most negative effects upon soils since recreation use will be increased and dispersed. The impacts discussed here will be the same as those documented in the no action option, Alternative 2, except for the following:

Direct Effects:

Due to the continuous nature of fuels over a large area, the risk to soils from large, high intensity burns in this alternative is greatest in the northeast portion of the wilderness, affecting approximately 3,800 acres in the Meeks, General, and Rubicon Creek watersheds. Late season fires here could be stand-replacing, especially if they occurred on sites with heavy litter and duff accumulation during dry years. A stand-replacing fire will consume soil cover, impair hydrologic function, alter soil structure, and reduce soil biota.

Initial disturbance required to locate and install fire rings will impact soils in those small, localized areas. Management zones in Opportunity Classes (OC) 3 and 4 will experience the most intense cumulative impacts due to the density of campsites. After establishment, cumulative impacts to soils can be minimized using designated fire rings and proper enforcement.

Increasing maximum group size and the number of overnight visitors will increase soil impacts on both trails and campsites. Trails will have greater traffic, thereby increasing trail width, trampling, and accelerating erosion. New campsites will be created, and existing sites will receive more use and enlargement; thus, soil compaction and exposure of bare mineral soil will increase.

An additional equestrian guide service will increase soil disturbance associated with recreational stock in areas of the northwest portion of the wilderness and Rockbound Valley; thus, trampling, compaction, and exposure of bare mineral soil will increase, due to increased stock traffic, tying animals to trees, and grazing. Guide services providing day hiking excursions will cause the same impacts as increasing day use visitors.

Expanding the current trail system will cause substantial localized soil disturbance where new trails are constructed in areas other than rock outcrop. Approximately 10 miles of trails will be created or improved. These proposed trail routes lie predominantly on durable rock land, with only 0.2 miles on the more sensitive Umbrepts soil group. Trail improvement and upgraded trail maintenance will improve soil stability by reducing potential erosion problems and decreasing the probability for user-created reroutes around rough or obstructed trail sections.

Soil impacts due to grazing will be reduced in this alternative in comparison to Alternative 2 (No Action) due to the implementation of Indicator Standards for grazing.

Indirect Effects:

Allowing natural fires to burn will result in consumption of soil cover and soil organic matter, and subsequent accelerated erosion in burn areas. If these fires are primarily of low intensity, these impacts will be minimal, and there may be a corresponding increase in soil fertility, as nutrients are released with fire consumption of organic matter. If these fires are primarily of high intensity, these impacts will be substantial, and there may be a corresponding decrease in long-term soil productivity. However, if fire intensities are within the natural range of variability, then any decrease in soil productivity is considered a natural ecosystem process.

Accelerated erosion will occur in areas with new or intensified recreation activity, as a result of decreased soil cover and increased soil compaction. Erosion may be minimized if trail and campsites are mitigated with protective cover, such as mulch or gravel.

Nutrient depletion due to wood gathering for campfires will significantly increase under this alternative, unless wood is brought in for this use, thus decreasing both short-term and long-term soil productivity.

Cumulative Effects:

Cumulatively, the negative impacts to soils will be increased under this alternative. Dispersal and intensified use will subject more land to the effects of trampling and denudation of vegetation, causing reduced soil cover and soil organic matter, increased soil compaction and erosion, and decreased soil productivity. On a watershed basis, an increase in impacted acreage can signal a trend toward approaching the disturbance threshold if large portions of the watershed are involved (such as in the case of a large, stand-replacing fire).

Grazing impacts which exceed Indicator Standards will recover over time as corrective grazing strategies are implemented. The rate of recovery will depend on the type and amount of change in grazing use.

Alternative 2 (No Action)

This alternative, which maintains the current management direction, will not improve soil conditions, and can increase cumulative negative impacts to the soil resource, with continued levels of use. There are no impacts to soils from dogs, recreational shooting, and aircraft Over-flights.

Direct Effects:

In wildland fires, high intensity burns cause the most significant soil damage. Suppression of wildfire reduces immediate negative soil effects, but increases the long-term risk of significant soil damage from stand-replacing wildfire, due to the build-up of heavy fuel-loading. Soil impacts from high intensity, stand-replacing wildfires include the following: volatilization of soil organic matter, consumption of vegetation and soil cover, increased pH, formation of hydrophobic soil layers with decreased infiltration and subsequent increased runoff, accelerated erosion, and mortality in soil biota populations. Areas of concern for potential large, stand-replacing wildfires include stands of heavy brush and timber which are located adjacent to the perimeter of the wilderness on the south and west sides and approximately 3,800 acres in the Meeks, General, and Rubicon Creek watersheds.

While grazing, stock can cause trampling and denudation of vegetation, mineral soil exposure, soil compaction, and stream bank destabilization. These impacts from grazing tend to be concentrated in riparian areas, such as meadows and streamside zones. Current management strategies such as herding, fencing, and use during range-ready conditions have minimized impacts, except in the most environmentally sensitive areas (areas of steep slopes with high erosion hazard, or areas with wet soils, etc.). However, soil degradation from historical grazing practices continues to be evident in some areas, such as along the crest of the Red Peak Stock Trail and at the pond southwest of Pyramid Peak.

Prohibition of wood fires protects the soil resource as long as enforcement is adequate to prevent illegal fires. If enforcement of campfire prohibitions is not adequate to prevent illegal campfires, then soil impacts from campfires, such as degradation of soil structure, loss of soil organic matter, volatilization of organic nutrients, and mortality in soil micro flora and fauna populations, are dispersed over a larger area.

Soil disturbance associated with camping includes compaction, vegetation and organic litter removal, and surface soil displacement. Typically, existing effects are moderate to severe in most established campsites in the Desolation Wilderness. Greater impacts are noted in campsites near lakes and streams, and in meadows, because of the natural sensitivity to disturbance for these riparian ecosystems. Group size affects the level of disturbance. Large groups cause greater impacts in individual campsites, due to the greater space required to accommodate them. Smaller groups have less of an impact.

Continuation of current levels of visitor use will perpetuate existing impacts to soil resources, such as trampling of vegetation (especially adjacent to lakes, streams, and trails), loss of soil organic material, exposure of bare mineral soil, soil compaction, and soil displacement.

Recreational stock grazing can impact soil resources, as described above, unless pack in feed is utilized. However, these impacts tend to be on a smaller, more concentrated scale than those from commercial grazing. Tying recreational stock to trees or hitch-lines causes severe soil displacement and disturbance in localized areas. These impacts can be minimized by hobbling stock overnight and tying for short periods only. Recreational stock traffic results in soil compaction, vegetation and organic litter removal, accelerated erosion, and damage to trees. As with other recreation use, larger pack groups cause disturbance over larger areas.

Commercial outfitter guides will continue to have the same impact if the current use levels are not exceeded. If the volume of visitors increases, however, there can be greater impacts on the soil environment. The effects generated by these groups are similar to those of general recreation use and include soil compaction, loss of vegetative and organic cover, and displacement of surface soil.

Trail construction and maintenance activities result in soil disturbance over a relatively localized area. Bare mineral soil is exposed through the removal of organic material, vegetation, and rocks. This exposed soil is subject to disturbance and displacement by visitor use and subsequent accelerated erosion. Soil compaction is most likely to occur in areas where the trail is wet or moist. In addition, trails in wet areas are particularly susceptible to gully erosion. Without adequate maintenance, these impacts from trails can be dispersed as visitors reroute traffic to avoid rough or obstructed sections of trail. These impacts occur on designated system trails, as well as on user-created trails, which are typically located around lakeshores, stream banks, and campsites.

Indirect Effects:

Suppression of fires prevents fire from playing a role in the function of ecosystems. For soils, this can have both beneficial and negative consequences. In the case of low intensity fires, burning of organic material increases short-term soil productivity and prepares the soil as seedbed for many species of plants. These benefits will not be realized with fire suppression. In the case of high intensity fires, burning often creates soil hydrophobicity and impairs soil hydrologic function, consumes soil cover and exposes bare mineral soil to accelerated erosion, and causes mortality in soil microflora and fauna populations. These negative impacts will be postponed with fire suppression.

Soil losses due to erosion may reduce soil productivity and health, particularly if nutrient-rich top soil is removed. Accelerated erosion may be attributable to many activities, such as grazing, trail maintenance, guide services, and recreation and stock use.

Loss of nutrients from organic matter displacement and use is also a potential effect associated with recreation. Removal of surface litter and woody debris occurs during wood gathering, camp development, and social trail creation. Recruitment of large woody debris may also be inhibited if standing material is used for illegal campfires.

Several indirect effects associated with soil compaction may result from many recreational uses. Compaction alters the hydrologic function of soils by reducing infiltration, permeability, and water holding capacity. Soil structure is also lost, reducing the number of macropores and inhibiting root egress.

Cumulative Effects:

The cumulative effects of soil impacts in campsite areas, grazing allotments, on trails, and trampled lakeshores and streambanks include decline of soil productivity and subsequent impairment of ecosystem function, which diminish the capacity for ecosystem recovery.

Alternative 3

Because this alternative only slightly modifies use compared to the current management plan, it will result in only a slight improvement over current conditions. Specifically, conditions will improve according to the Opportunity Class Allocations outlined for this alternative. Impacts associated with this alternative will be the same as those listed in Alternative 2 except for the following:

Direct Effects:

Soil impacts due to grazing will be slightly reduced (compared to Alternative 2) due to implementation of indicator standards for range management and due to discontinuation of herding into specific lake basins (Maude Lake, Twin Lakes, Grouse Lake, Lyons Lake and Lake Sylvia).

Fires burning under prescribed conditions will most likely have slight to moderate impacts to soils, including consumption of organic litter layers, volatilization of organic nutrients, degradation of surface soil structure, and creation of soil hydrophobicity. Although prescribed fire will reduce the risk of stand-replacing wildfire in the long term, the potential for significant soil impacts due to stand-replacing wildfires in the near future still exists in the same heavily forested areas identified in Alternative 2.

Soil impacts, including consumption of organic litter layers, volatilization of organic nutrients, degradation of surface soil structure, and creation of soil hydrophobicity, will occur in Opportunity Classes 1 and 2, where campfires were allowed. Negative soil impacts may also occur in Classes 3 and 4 if dispersed illegal use occurred.

The quota system initiated in this alternative can have mixed effects upon the soils. In Opportunity Classes 1 and 2, a reduction in group size and a limit on recreational stock will decrease the overall extent of soil disturbance in campsites due to stock traffic and camping. Extending the quota period will also serve to decrease soil disturbance, particularly during the wet month of May. These benefits can be counteracted, however, by an increase in visitors per night and dispersal of use to lesser impacted zones. Higher numbers of visitors will contribute to compaction and higher use of available campsites. Additionally, by moving campers to lesser used areas, new sites or previously low impact sites may have increased disturbance. Similarly, closing the six lake areas to overnight camping will move impacts to less used sites. Soil conditions at the closed lakes will improve with natural recovery. However, due to cold soil temperatures, short seasons for biologic activity, and generally harsh environmental conditions, this natural recovery process will be extremely slow (perhaps tens of decades for recovery from severe impacts). Planned restoration of campsites will improve soil conditions relatively rapidly (perhaps in a decade or two), if rehabilitation measures were effective, and if enforcement of closures was adequate.

Construction of new trail segments when re-routing trails will create new soil impacts, such as removal of soil cover and exposure of mineral soil, compaction and accelerated erosion. If old trail segments were successfully rehabilitated, those soil impacts will be mitigated. However, if old trail segments were merely abandoned, they will continue to be a source of soil erosion and other soil impacts for a long period of time (perhaps many decades).

Indirect Effects:

Short-term soil fertility may be enhanced through low intensity burns, or decreased by high intensity fires. In Opportunity Classes 1 and 2, soil productivity will be decreased with loss of habitat for soil microbes and depletion of soil nutrient reserves due to wood gathering for campfires. Soil productivity may also decrease elsewhere if illegal fires occur.

Indirect effects associated with soil compaction may increase as a result of dispersing recreation. These indirect effects include loss of soil porosity, reduced available water, decreased infiltration and impaired hydrologic function, and inhibited root penetration for revegetation.

Cumulative Effects:

If low intensity prescribed and natural fires occur at somewhat regular intervals over time, restoration of ecosystem dynamics may lead to an increase in soil health and productivity.

More overnight visitors will result in greater cumulative soil impacts, especially in campsites; while closing six lakes to camping will disperse impacts to other areas.

Natural restoration may only be effective after a long period of time (perhaps tens of decades), due to cold soil temperatures, short season for biologic activity, and harsh environmental conditions of the area.

Dispersal of grazing out of high use recreation areas will reduce cumulative effects of compaction from multiple sources.

Alternative 4

Reducing visitor numbers, developing fire management zones, and implementing restoration efforts will support improvement in ecosystem function. Therefore this alternative will have more positive effects with respect to soils compared to Alternatives 1 - 3. Consequences of this alternative will be the same as those documented in Alternative 3 except for the following:

Direct Effects:

Soil impacts due to grazing can be reduced compared to Alternatives 1, 2 and 3 due to herding strategies hat would protect sensitive areas during dry years.

Prohibition of wood fires protects the soil resource as long as enforcement is adequate to prevent illegal use. If this restriction cannot be sufficiently enforced, soil impacts will occur due to dispersed, illegal fire activity.

Removal of campsites located in riparian areas will allow for recovery of impacted soils, if enforcement of closures was adequate. The natural rate of recovery will be extremely slow, however, due to cold soil temperatures, short seasons for biologic activity, and harsh environmental conditions. If new campsites were developed by visitors displaced to other areas by these closures, then new soil impacts; such as trampling and denudation of vegetation, exposure of bare mineral soil, compaction, and accelerated erosion; will occur.

Further reductions in the number of people per group and the amount of overnight and day users will reduce the immediate impacts to soils on both trails and campsites.

Reducing the number of recreational stock and lowering the amount of use that guide services can provide will also reduce the amount and extent of immediate trampling damage to trails and campsites.

Indirect Effects:

An overall reduction in soil compaction and accelerated erosion is possible in this alternative since the number of people and animals becomes more restricted. The rate of soil recovery from existing impacts will be extremely slow, however, due to environmental conditions (mentioned above). Dispersing use through camping quotas may cause additional soil impacts in areas with only low to moderate impacts previously.

With the restriction of campfires and the subsequent retention of organic materials, soil nutrient reserves and habitat for soil microbes will increase.

Cumulative Effects:

Soil health and productivity may be improved further in this alternative compared to Alternatives 1 through 3, due to the decrease in immediate impacts to soil resources associated with recreation use. However, existing cumulative impacts to soils will persist for a lengthy period of time (most likely decades) due to the slow rate of natural recovery. Rehabilitation of campsites and trails will improve soil productivity and ecosystem function, if restoration methods are effective and if enforcement of closures is adequate. Regulating fire to allow natural processes to resume their function on a greater scale will also improve ecosystem function. Implementation of herding strategies for high recreation use areas will disperse grazing impacts, thereby reducing the potential for cumulative effects.

Alternative 5

Soil conditions can be improved with this alternative, to a greater extent than Alternatives 1- 4, since visitation levels are reduced and restoration projects are increased compared to those proposed in Alternatives 1- 4. The impacts associated with this alternative are the same as those identified in Alternative 3 except for the following:

Direct Effects:

Prohibition of wood fires protects the soil resource as long as enforcement is adequate to prevent illegal use. If this restriction cannot be sufficiently enforced, soil impacts will occur due to dispersed, illegal fire activity.

Removal of campsites located in riparian areas will allow for recovery of impacted soils if enforcement of closures is adequate. The natural rate of recovery will be extremely slow, however, due to cold soil temperatures, short seasons for biologic activity, and harsh environmental conditions. If new campsites are developed by visitors displaced to other areas by these closures, then new soil impacts will occur (such as trampling and denudation of vegetation, exposure of bare mineral soil, compaction, and accelerated erosion).

Further reductions in the number of people per group and the amount of overnight and day users will reduce the immediate impacts to soils on both trails and campsites.

Reducing the number of recreational stock and lowering the amount of use that guide services can provide will also reduce the amount and extent of trampling damage to trails and campsites.

This alternative will consider the removal and rehabilitation of trails in Opportunity Classes 1 and 2. If management rehabilitation efforts are successful, these closed trail segments will no longer be a source of accelerated erosion. However, if these trails are simply closed without rehabilitation, they will continue to be a source of accelerated erosion for a long period of time (especially if these trails continue to be used by wilderness travelers).

Grazing impacts will be the same as in Alternative 4.

Indirect Effects:

An overall reduction in soil compaction and accelerated erosion is possible in this alternative, since visitor use is restricted and reduced. The natural rate of soil recovery from existing impacts will be extremely slow, however, due to environmental conditions (mentioned above). Dispersing use through camping quotas may cause new soil impacts in areas with only low to moderate impacts previously.

With the restriction of campfires and the subsequent retention of organic materials, the soil nutrient reserves and habitat for soil microbes will increase. The amount and rate of increase will depend on adequate enforcement of regulations.

Cumulative Effects:

Because the limits on visitor use are lower than those prescribed in Alternatives 1- 4, improvements to soil health and productivity can be greater. However, due to the slow rate of natural recovery, existing cumulative impacts to soils will persist for a lengthy period of time (most likely decades). Rehabilitation of campsites and trails will improve soil productivity and ecosystem function, if restoration methods are effective and if enforcement of closures is adequate. Regulating fire to allow natural processes to resume their function on a greater scale will also improve ecosystem function.

Alternative 6

The objective of this alternative is to provide the most protection to the biophysical wilderness resources; therefore it has the least immediate impacts to soil resources compared to Alternatives 1 through 5. The effects of this alternative are the same as noted in Alternative 3, except for the following:

Direct Effects:

Eliminating grazing within the Rockbound Allotment allows for continued recovery of soil resources from past grazing impacts. Resting wilderness portions of allotments that do not meet Desired Future Condition (DFC) will eliminate immediate soil impacts associated with grazing and allow for recovery of soil resources. Existing cumulative impacts, however, may persist for an extended period of time (perhaps decades) due to extremely slow natural recovery rates for vegetation and soil impacts.

Packing out all human waste will eliminate soil displacement caused by using cat-holes. As with other uses, this must be effectively enforced to achieve an improvement in soil quality.

Prohibition of wood fires protects the soil resource as long as enforcement is adequate to prevent illegal use. If this restriction cannot be sufficiently enforced, soil impacts will occur due to illegal wood fire activity.

Campsite removal in excess of the 617 in riparian areas, will allow for recovery of impacted soils, if enforcement of closures is effective. The natural rate of recovery will be extremely slow, however, due to cold soil temperatures, short seasons for biologic activity, and harsh environmental conditions. If visitors displaced to other areas by these closures developed new campsites, then new soil impacts (such as trampling and denudation of vegetation, exposure of bare mineral soil, compaction, and accelerated erosion) will occur.

Limiting recreational stock and equestrian guides to day use will minimize soil disturbance due to grazing and tying of animals in campsites. However, this reduction in soil disturbance may be minimal if stock users continue to graze or tie animals during day use. Impacts of horses on the trails will most likely remain the same, but can increase if outfitter guide stock traffic increased in order to supply dunnage trips.

Reducing the group size limit to 6 will tend to reduce the area of soil disturbance and compaction in campsites, when compared to damage typically caused by larger parties. A substantial decrease in the number of overnight and day users will reduce immediate soil impacts; however, existing cumulative impacts will persist for lengthy periods of time (perhaps decades) due to the extremely slow rate of natural recovery.

Closure of trails will reduce sources of accelerated erosion, if those trail segments are successfully rehabilitated; however, if old trail segments are merely abandoned, they will continue to be a source of soil erosion and other soil impacts for a long period of time (perhaps decades).

Indirect Effects:

Short-term soil fertility may be enhanced through low intensity burns, or decreased by high intensity fires. Soil productivity will be increased with accumulation of woody organic material for soil nutrient reserves and habitat for soil microbes, if campfire prohibitions are effectively enforced. If range allotments are rested in order to meet DFCs, soil resource conditions will have the opportunity to recover from previous impacts.

Cumulative Effects:

Because the limits on visitor use are lower than those prescribed in Alternatives 1- 5, improvements to soil health and productivity can be greater. However, due to the slow rate of natural recovery, existing cumulative impacts to soils will persist for a lengthy period of time (most likely decades). Rehabilitation of trails and campsites will improve soil productivity and ecosystem function, if restoration methods are effective and if enforcement of closures is adequate. Regulating fire to allow natural processes to resume their function on a greater scale will also improve ecosystem function.

2. AIR QUALITY

Possible effects of management alternatives upon the air resources within the Desolation Wilderness have been assessed in terms of the type of pollutants emitted and their associated impacts. There are several management actions included in each alternative that have the potential to adversely affect air quality. These are fire management, emissions from visitor and agency vehicle use, trail and trailhead construction, and dust produced by vehicle travel on both paved and unpaved roads. Pollutants generated by these actions include nitrogen oxides, volatile organic compounds (VOCs), carbon monoxide, particulates, sulfur oxides, ozone, and toxic substances. Each pollutant and its associated impact is discussed below:

Particulates

Particulates are airborne solids and liquids which can remain in the atmosphere from periods of several seconds to several months. They vary considerably in size, chemical composition, and physical properties. The three fundamental methods of particulate formation include materials handling and soil disturbance, gas conversion reactions in the atmosphere, and combustion processes.

Particulates range in size from approximately 0.005 to 500 microns. The "fine" particles (>2 microns in diameter) are formed primarily by atmospheric processes, while coarse particles (<2 microns in diameter) are usually produced by mechanical means. Fine particles may be transported 1000 km or more from the original source, and are a primary factor in visibility degradation.

Particulate matter may be also classified as either primary or secondary. Primary particles are produced during physical and chemical processes within a source, then emitted directly into the atmosphere. Secondary particles are formed within the atmosphere as the result of gaseous chemical reactions.

State and Federal standards are currently established for PM_{10}, which is defined as particulate matter with an aerodynamic diameter of ten microns or less. Major anthropogenic sources of PM10 include internal combustion engines, fires, dirt roads, and construction sites.

Particulates have been correlated with increases in the level of respiratory infections, cardiac disease, pneumonia, bronchitis, asthma, emphysema. Particulate matter may cause both direct and indirect damage to vegetation, including reductions in growth and yield, increased incidence of disease, injury to leaf cells, suppression of photosynthesis, and death. Overall changes in plant species composition may occur near large particulate sources. Soiling and corrosion of various

surfaces (including paints and metals) can result from particulate deposition. Particulates also play an important role in visibility degradation. When light encounters particles in the atmosphere, it is often absorbed or scattered. This in turn reduces contrast and coloration, resulting in a "washed out" appearance and a decreased range of sight. Particulate sources related to management of the Desolation wilderness will include:

1. Soil disturbing activities such as trail construction, trailhead facility construction, vehicle travel on unpaved roads, entrained dust from paved roads, and unpaved parking areas.

2. Emission producing activities such as heavy equipment use for road maintenance, trailhead construction, increases in the number or size of wilderness trailhead parking areas, and increases in the number of vehicle trips made by wilderness users.

3. Combustion from visitor campfires, natural fire, and prescribed fire.

Sulfur Oxides

Sulfur oxides are produced when fuels containing sulfur undergo combustion. The main anthropogenic source of sulfur oxides is fossil-fuel combustion for electric power generation. Very low levels of sulfur oxides are produced during combustion of forest fuels. Sulfur oxides undergo several chemical transformations when they are emitted into the atmosphere. When combined with moisture they form sulfuric acid, a primary constituent of acid rain and fog. They may also undergo transformation into particulate matter, thus decreasing visual quality. Sulfur oxide pollution in the form of acid deposition can damage plants by causing chlorosis, damaging leaf tissue, and reducing growth. Acid rain may also alter the soil substrate by leaching important plant nutrients. Acidification of surface waters may alter the community structure of aquatic habitats, up to the point of complete sterilization. Sulfur oxides contribute to health problems, including eye, nose, and throat irritation, and decreases in respiratory function. When sulfur oxides exist in conjunction with particulate matter; increased levels of lung cancer, respiratory diseases, and higher mortality rates have been documented. Materials damage such as metal corrosion, chemical corrosion of building materials, paints, textiles, paper, and leather is another effect of sulfur pollution. The major source of sulfur oxides relating to management activities for the Desolation will be motor vehicle use.

Nitrogen Oxides

Nitrogen oxides are formed whenever any fuel is burned in air. Primary anthropogenic sources include vehicle transportation, energy production, and heating processes. Nitrogen dioxide gas is able to penetrate deep into the lungs and cause tissue damage. It also decreases resistance to respiratory diseases in both humans and animals. Tissue damage, growth suppression, and chlorosis are documented impacts from nitrogen exposure to plants. Nitrogen oxides also contribute to acid deposition and visibility reduction in a manner similar to sulfur oxides. When combined with Volatile Organic Compounds (VOCs) and sunlight, they are a major component in the production of the photochemical oxidant ozone. The major nitrogen oxide sources related to management of the Desolation Wilderness will include visitor motor vehicle use, prescribed fire, campfires, and wildfire (human-caused and natural).

Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (including hydrocarbons) include all organic compounds with appreciable vapor pressures. Sources include motor vehicles, industrial operations such as petrochemical processing, solvent evaporation, and fire. Few have any known adverse impacts on humans, animals, plants, or materials, although there are exceptions. One of these is benzo-a-pyrene, a known carcinogen. Their primary importance lies in their contribution to the production of ozone, which can injure human health and some plant species. Sources of VOCs from management of the Desolation will include motor vehicle use, forest fires, and campfires.

Ozone

Ozone is classified as a secondary pollutant. It is formed in the atmosphere through a series of chemical reactions involving NO_X, VOCs, and sunlight. This process takes several hours, and may result in high ozone concentrations far downwind from the original source. Major sources of ozone-forming pollutants are motor vehicles and industrial processes involving organic solvents. Ozone is a severe eye, nose and throat irritant. Long-term exposure can result in the premature, irreversible aging of lung tissue. Ozone is severely phytotoxic, causing impacts such as leaf discoloration and death of leaf tissue. Manmade materials such as synthetic rubber, textiles, and paints are also known to deteriorate when exposed to ozone. The amount of ozone produced by wilderness management activities is directly related to the amount of nitrogen oxides and VOCs emitted.

Carbon monoxide

Carbon monoxide is a colorless, odorless, tasteless gas that is formed by incomplete combustion. Major anthropogenic sources include transportation, solid waste disposal, burning operations, and steel production.

This gas is essentially harmless to plants or materials, but can have significant impacts on human health. Prolonged exposure to levels above 50 parts per million (ppm) interfere with oxygen transport to body tissues. Exposure to levels of 1000 ppm or greater can cause death. Motor vehicles and fire will be the major sources of carbon monoxide in relation to wilderness management activities.

Toxic compounds

Toxic compounds are produced during the combustion process. Some smoke components, including many of the polycyclic aromatic hydrocarbons, are known to be carcinogenic. Other compounds, such as acrolein and peroxyacyl nitrate are acute eye irritants. Smoke is also a concern due to its impact on visibility. The primary source of toxic substances for the Desolation are prescribed fire, wildfire (natural and human-caused), and campfires.

Effects Common to All Alternatives

Direct Effects:

Visibility

Visibility may be simply defined as the ability to see an object clearly. This ability is limited in an "unpolluted" atmosphere by 1.) blue sky scattering 2.) the curvature of the earth's surface, and 3.) suspended natural aerosols. Natural visibility is also a function of altitude, with higher altitudes resulting in an increased visual range. "Natural" visibility reduction occurs during wildfires, fogs, rain, snow, windblown dust, and volcanic eruptions. Anthropogenic visibility reduction is caused by the scattering and absorption of light by human-produced suspended particles and gases. Light scattering and light absorbing pollutants reduce the amount of light received from viewed objects, and scatter ambient light back into the line of sight. This scattered light is perceived by the viewer as haze.

Visibility impairment may be defined as a reduction in visual range and/or atmospheric discoloration. There are three general categories of visibility impairment; 1.) regional haze, in which visibility is uniformly reduced; 2.) pollutant, dust, and smoke plumes; and 3.) layered haze, or "bands" of discoloration.

Common sources of pollutants that negatively impact visibility include stationary source fuel combustion, transportation, and industrial processes. Key visibility-reducing pollutants include sulfur oxides, nitrogen oxides, and particulates. Nitrogen dioxide gas possesses a significant absorption band in the visible part of the spectrum. This gas is strongly blue-absorbing, producing red, yellow, or brown discoloration. Nitrogen oxides and sulfur oxides also undergo transformation in the atmosphere to produce aerosols, or fine solid and liquid particles. Light scattering by particulate matter is the most important cause of degraded visual air quality.

Visibility is one of the air quality related values identified for the Desolation wilderness. Smoke from burning, or dust from a construction project will contribute to temporary, localized visibility impacts.

National and State Ambient Air Quality Standards

Six "criteria" pollutants are subject to these standards: particulate matter less then ten microns in diameter (PM_{10}), carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and ozone. These are pollutants that have been identified as endangering the public health and welfare. States may also set ambient air quality standards more stringent then those adopted on a national basis, which is the case in California. Wilderness management related projects must be analyzed on an individual basis to ensure they will not cause or contribute to a state or federal air standard violation. Activities that can contribute to air standard violations include; trailhead and access road construction and maintenance, visitor and agency vehicle use, prescribed fire, and campfires.

Conformity

Section 176 (c) of the Clean Air Act prohibits Federal agencies from permitting, approving, providing financial assistance to, or supporting in any way any activity which does not conform to a State Implementation Plan. For areas designated as a non-attainment or maintenance area, a federal agency must not take any action inconsistent with the regulations for determining conformity, 43 CFR 93.150 et seq. A federal agency must make a determination of conformity if the activity's direct and indirect emission levels above baseline quantities equal or exceed a specific de-minimus level, if the proposed emissions are equal to 10 percent of the non-attainment area's total emissions, or if not otherwise exempted (40 CFR 93.153).

Direct emissions are defined as those that are "caused or initiated by the Federal action, and occur at the same time and place as the action". Indirect emissions are those that take place later in time, or away from the project location. Direct and indirect emissions must be reasonably foreseeable, and the Federal agency must have the ability to control them as part of its continuing program responsibility.

The Desolation is located in Eldorado county, and lies within two air basins. The Lake Tahoe basin is in non-attainment status for the National Ambient Air Quality Standards (NAAQS) for carbon monoxide. The Eldorado portion of the Sacramento-Metro basin is in serious non-attainment status for ozone. The levels of VOC's, nitrogen oxides, and carbon monoxide emitted by alternative may be seen in the Tables in the Air Quality Appendix (B). All above-baseline emission levels fall below the *de-minimus* amounts requiring a conformity determination.

Public Health and Safety

Prescribed fire and wildfire presents a hazard to firefighters and members of the public by producing particulate matter, gases (carbon monoxide, carbon dioxide, and nitrogen oxides), and toxic materials. Particulate matter can damage the human respiratory system when small particles are taken deep into the lungs. Adverse effects from carbon monoxide can range from slight headaches to nausea to death, depending on the amount of CO present and the length of exposure. Nitrogen dioxide can cause nose and eye irritation, pulmonary edema, bronchitis, and pneumonia. Toxic smoke constituents such as benzo-a-pyrene (BaP) are carcinogenic. Health impacts are most likely in sensitive individuals, including the very young, very old, and individuals with established health problems. In addition, smoke can obscure visibility within the immediate area of a fire, increasing the need for vigilance on the part of fire personnel.

Indirect Effects:

Visibility

As noted in the previous section, particulates are a major factor in visibility impairment. Airborne particles, or those formed during chemical reactions in the atmosphere can impact visibility at locations far away from the original source. Vehicle emissions, fugitive dust, and fire (including campfires) may all contribute to non-localized visibility impairment.

National and State Ambient Air Quality Standards

Pollutants generated locally may contribute to violations of ambient air quality standards in other areas. However, the airshed in which the Desolation is located (Mountain Counties) is identified by the California Air Resources Board as a net receptor of air pollutants.

Conformity

Section 176 (c) of the Clean Air Act prohibits Federal agencies from permitting, approving, providing financial assistance to, or supporting in any way any activity which does not conform to a State Implementation Plan. This Section applies to only to Federal non-attainment and maintenance areas. Federal agencies are required to conduct a conformity determination for any action whose total direct and indirect emissions equal or exceed a specific de-minimus level. If the proposed action is an expansion or alteration of existing activities, the de-minimus standards apply only to projected increases over the current "baseline" level. A determination is also required if proposed emissions are equal to 10 percent of the non-attainment area's total emissions.

Indirect emissions are those caused by the Federal action, but "may occur later in time and or be further removed in distance from the action itself". The indirect emissions must be reasonably foreseeable, and the Federal agency must have the ability to control them as part of its continuing program responsibility. This will include new emissions above the existing baseline related to management actions taken in the Desolation. Twenty percent of wilderness visitors are from within fifty miles of the Desolation (Watson 1991). Fourteen percent are from out of state. The longest possible route through a non-attainment area for a potential wilderness visitor will be through the San Joaquin Valley air basin, a round trip of some 700 miles. The San Joaquin is in serious non-attainment status for PM_{10} and ozone. A worse case scenario in which all of the overnight visitors above current levels (with the exception of the 20 percent local and 14 percent out of state) as well as the projected 11 percent increase in day users travel through the Basin will still not cause *de minimus* levels to be exceeded.

Recreation

Some short-term reductions in the quality of the wilderness visitor's experience may occur during wildfire and prescribed fire situations due to odor, visibility, comfort, and health impacts from smoke. The air quality conditions prior to European settlement, however, often included baseline smoke from local and regional fire activity.

Public Health and Safety

Prescribed burning may have the potential to adversely affect visibility at locations outside the wilderness, such as on local highways, in local communities, or in campgrounds. Sensitive individuals may also suffer negative health impacts from transported smoke. Visibility conditions before European settlement often included smoke from local and regional fires.

Cumulative Effects:

Global warming

The main contributor to global climate change over the past century has been carbon dioxide. Carbon dioxide is released through the burning of fossil fuels, and plays a key part in heat retention within the earth's atmosphere. Increases in carbon dioxide and other greenhouse gases cause a corresponding increase in global temperature. This in turn may disrupt regional weather patterns, resulting in more extreme weather behavior and/or a rise in sea level. The consequences of Desolation Wilderness management activities should be insignificant at a global level, but knowledge of cumulative processes and impacts is still incomplete.

Regional Haze

The combination of pollutants from various sources such as agricultural burning, population centers, industrial sources, and transportation may contribute to the degradation of visibility over a large area. Particulate emissions from fire management, and emissions from wilderness visitor vehicle use may contribute to this phenomenon. Impacts on regional haze should be considered at the project level.

Comparison of the Alternatives

The degree of air quality impacts for each alternative were based on the following criteria:

1. Level of emissions generated by wilderness visitor vehicle trips.

2. Campfire restrictions.

3. Trail construction, maintenance, and use.

4. Fire management is one of the criteria for analysis when considering impacts on the air resource. In general, prescribed fire (both planned and prescribed natural ignitions) takes place under conditions favorable to emission reduction and dispersion. It also reduces the risk of a catastrophic wildfire with high emission levels by decreasing fuel loading.

Management policy in the Desolation has been directed towards fire suppression. This has resulted in increased fuel loading within certain portions of the wilderness, with the greatest danger of large stand replacing wildfires occurring in the northeast portion of the wilderness or along the southern and western borders. General impact trends due to fire management activities have been noted for each of the following alternatives. For calculated emissions by alternative, see the Tables in the Appendix B.

Alternative 1

This alternative will have the greatest negative impact on air resources.

In this alternative, overnight visitor use is increased to 793 persons per night between June 15th and Labor Day. There are no restrictions on day use, and total use of the wilderness is expected to increase. As a result, vehicle emissions (NO_X, CO, and hydrocarbons) will reach the highest level of all six alternatives (See Appendix B) Particulate emissions from unpaved roads and entrained dust from vehicle tires will also reach the highest level for all of the alternatives.

Wood campfires will be allowed in all areas, providing the greatest impacts from campfire smoke. Prior to the ban on wood campfires, approximately seventy-five wildfires per decade were started by escaped campfires. With the reintroduction of campfires to all portions of the Desolation, the potential for impacts from wildfire emissions will be increased. Prescribed natural fire will also be permitted within the wilderness after September 15th in Opportunity Class 2, which accounts for almost 50 percent of the land base under this alternative. The potential for escaped PNF is rated as high; due to time of year, fuel, and wind conditions. Again, this will result in an increase in emissions. Forty-seven acres per year are projected to burn under Alternative One, compared to an annual average of 2.5 acres over the past thirty years. However, the Desolation's fire history also includes two large fires of 1,000 and 2,000 acres respectively. The potential for fires of this size to reoccur increases in proportion to fuel-buildup from fire exclusion.

An additional fifteen miles of trail will potentially be added to the current system, thus increasing particulate emissions from trail use, construction and maintenance. The introduction of crushed granite to "harden" major trails will also be a new, although temporary, source of particulate matter.

Two trailheads will be upgraded. This may include paving of both the trailheads and their associated access roads. Short-term impacts caused by grading and paving activities will occur, however, dust emissions will be reduced in the long term.

Alternative 2 (No Action)

This alternative will have less impact on air resources than Alternative 1, but will have greater impact than Alternatives 3 through 6.

In this alternative, there will be an overnight quota of 700 persons between June 15th and Labor Day. There will be no day use quota, and day use will be expected to increase. Maximum visitor vehicle emissions will be slightly reduced from those in Alternative 1. Particulate emissions from unpaved roads and entrained dust from vehicle tires will also decrease slightly in response to the decrease in vehicle trips.

Wood campfires will be prohibited in all portions of the wilderness. Wood camp stoves with spark arresters will be permitted. Use of wood camp stoves is limited by weight and design considerations, so particulate emissions from wood fires will decrease.

The number of escaped campfires will be reduced to approximately twenty per decade, decreasing the likelihood of wildfire. However, continuing fire exclusion under this alternative will increase the potential for large, stand replacing fire events. Though the incidence of wildfires will decrease, fire intensity and total emissions will increase as fuel accumulation continues. Trails will be maintained at current levels, which will confine particulate emissions relating to use and maintenance at current standards.

Alternative 3

Alternative 3 will have less impacts on the air resource than Alternatives 1 and 2, but greater impacts than Alternatives 4 through 6.

In this alternative, the overnight visitor quota will be reduced to 582 persons from May 1 through September 30th. Total day use will be limited to 281 permits per day. Maximum visitor vehicle emissions will be reduced from Alternatives 1 and 2. Particulate emissions from unpaved roads and entrained dust from vehicle tires will also decrease.

Wood campfires will be permitted in Opportunity Classes 1 and 2 (74 percent of the wilderness land base), and wood camp stoves will be permitted in all Opportunity Classes. Emissions from visitor fires will be intermediate between Alternatives 1 and 2.

The number of wildfires caused by campfire escapes will be less then Alternative 1, but greater then Alternative 2. Planned and natural fire will be allowed throughout the wilderness, with exceptions for visitor safety and areas with high potential for fire to escape the wilderness boundary. This can result in an annual emissions increase, with a resultant decrease in emissions from catastrophic events as fuel loading decrease.

No new trails will be added to the current system within the wilderness. However, if new trails outside of wilderness are developed to provide recreational opportunities, particulate emissions adjacent to wilderness will be increased.

Alternative 4

Alternative 4 will have fewer impacts on the air resource than Alternatives 1 through 3, but more than Alternatives 5 and 6.

In this alternative, the overnight visitor quota will be reduced to 495 persons from May 1st through September 30th. Day use will be limited to 211 permits per day. Maximum visitor vehicle emissions will be reduced from those produced in Alternatives 1 through 3. Particulate emissions from unpaved roads and entrained dust from vehicle tires will also decrease.

Wood campfires will be prohibited. Wood camp stoves with spark arresters will be permitted in all management zones within the wilderness. Use of wood camp stoves is limited by weight and design considerations, so particulate emissions from wood fires will decrease.

The number of human-caused wildfires will decrease, resulting in a lower rate of emissions. Prescribed natural and planned ignition fire will be permitted in all areas of the wilderness after the establishment of conditional fire management zones. Average annual emissions may increase somewhat under these conditions, but catastrophic emissions events from wildfires will most likely decrease.

No new trails will be added to the current wilderness trail system, and some trails may be removed, resulting in a decrease in particulate emissions relating to maintenance and use activities. However, if trails outside of wilderness are developed to replace those rehabilitated within the Desolation, this reduction may be partially or fully offset.

Alternative 5

This alternative will have fewer effects on the air resource than Alternatives 1 through 4, but more than Alternative 6.

In this alternative, the overnight visitor quota will be reduced to 402 persons from May 1st through September 30th. The number of day use permits will be limited to 165 per day. Maximum visitor vehicle emissions will be reduced from those produced in Alternatives 1 through 4. Particulate emissions from unpaved roads and entrained dust from vehicle tires will also decrease.

Wood campfires will be prohibited, but wood camp stoves with spark arresters will be permitted in all management zones within the wilderness. Use of wood camp stoves is limited by weight and design considerations, so particulate emissions from wood fires will decrease.

The number of human-caused wildfires will decrease, resulting in a net decrease in emissions. Prescribed natural and planned ignition fire will be permitted in all areas of the wilderness after the establishment of conditional fire management zones. Average annual emissions will increase under these conditions, but catastrophic emissions events from wildfires will most likely decrease. Catastrophic events that have occurred in the Desolation include one 1,000 acre and one 2,000 acre fire. The largest amount of acreage projected to burn an alternative is approximately 57 acres. No new trails will be added to the system. Areas adjacent to the wilderness will be considered for new trails. Trails in Opportunity Class 1 and 2 will be considered for removal/rehabilitation, thus reducing particulate emissions produced by use and maintenance activities. Other trails will be maintained for resource protection only, again reducing particulate emissions relating to maintenance. However, if trails outside of wilderness are developed to replace those rehabilitated within the Desolation, this reduction may be partially or fully offset.

Alternative 6

This alternative will provide the greatest level of protection for air resources.

In this alternative, the overnight visitor quota will be reduced to 264 persons, and the day use quota will decrease to 104 permits. Quota dates will extend from April 1st through October 31st. Maximum visitor vehicle emissions will be reduced from those produced in Alternatives 1 through 5. Particulate emissions from vehicle trips on unpaved roads and entrained dust from vehicle tires will also decrease. Limiting trailhead parking at specified locations will also result in a decrease in auto emissions.

Wood campfires will be prohibited, but wood camp stoves with spark arresters will be permitted in all management zones within the wilderness. Use of wood camp stoves is limited by weight and design considerations, so particulate emissions from wood fires will decrease.

The number of human-caused wildfires will decrease, resulting in a net decrease in emissions. Prescribed natural and planned ignition fire will be permitted in all areas of the wilderness after the establishment of conditional fire management zones. Average annual emissions will increase under these conditions, but catastrophic emissions events from wildfires will most likely decrease.

No new trails will be added to the system. All but the major trails will be removed, and trail maintenance will take place at the primitive level. This will result in a decrease of particulate emissions relating to trail construction, maintenance, and use.

3. FIRE

Alternative 1

Direct Effects:

Under this alternative, the current ban on campfires will be lifted, and it is expected that the number of escaped campfires will return to historic levels. This will mean an increase of person-caused wildfires to approximately 8.5 per year, or 7 more than are currently escaping under Alternative 2. More suppression effort will be required due to the increased number of wildfires. It is estimated that an average of approximately 25.4 acres will burn each year by wildfire under this alternative.

In this alternative, it is estimated that approximately 22 acres per year will burn under the Prescribed Natural Fire (PNF) program conducted after September 15 each year. Monitoring of the PNF program will be required after September 15 of each year, per Forest Service Manual Direction.

Indirect Effects:

Because the PNF program does not start until September 15 of each year, control will be the only suppression option available prior to that date. It is estimated that each year approximately 12 acres fewer will be burned under PNF, than if the program starts right after snow melt each year.

On the Eldorado, management-ignited (planned ignition) prescribed fire will probably be used during the first decade to reduce fuel loading outside the perimeter of the wilderness in areas where heavy fuel accumulations have built up due to fire exclusion. Within the Desolation Wilderness, management-ignited prescribed fire is not allowed in this alternative. There will be a reduction in acres burned (approximately 100 acres per year) in this alternative, as compared to alternatives 3, 4 and 5, because management-ignited prescribed fire will not be used.

The element of risk associated with the escape of a PNF fire is present under this option. So also are the associated damages that will occur if an escape were to happen.

Cumulative Effects:

Because the start date for the PNF program is September 15 each year and because there is no direction for management-ignited prescribed fire, this alternative will have between 12 and 134 fewer acres burned each year than alternatives 4, 5, and 6. The burned acres will occur in Opportunity Class 2 areas and lead to reduced fuel loading over time in those areas. The amount of fuel reduction will be minimized compared to Alternatives 3 through 6 due to the low occurrence of lightning caused fires after mid-September.

There will be a risk of escape from the Desolation where there are continuous forested lands at the wilderness boundary in Opportunity Class 2 areas. This risk can be minimized by treating fuels by management-ignited fires and/or other means outside the wilderness boundary.

Alternative 2 (No Action)

Direct Effects:

It is estimated that an average of approximately 24 acres will burn by wildfire each year under this alternative. Most of this acreage will burn due to larger wildfires. With the campfire ban in effect there will be approximately 2 small escaped wildfires that will need suppression effort each year. Control will remain the only suppression option available on the Eldorado side of the wilderness and the guidelines of the Interim Fire Management Plan (LTBMU) will continue to be the operating guidelines on the LTBMU side of the wilderness.

Indirect Effects:

It is anticipated that under this alternative, the least amount of suppression effort will be expended of all the alternatives for the first decade. With the campfire ban in place, no PNF program, no management ignited prescribed fire program, and an assumption that no matter what alternative is selected, at least one more large fire may occur before any management strategy will take effect, this alternative has the potential for the least amount of suppression effort during the first decade of implementation.

In this alternative, there will be no direction to use management-ignited prescribed fire and/or PNF.

Cumulative Effects:

The management strategy under this alternative will continue to place all timber stands inside the wilderness at risk of stand replacing fire, since wildfires will only burn an average of 24 acres each year. Management emphasis for all types of fire inside the wilderness, will, for the most part, continue to be fire exclusion, under this alternative. Fuel loading will increase more in this alternative than in alternatives which allow management of prescribed fire. Should a wildfire start in areas where there are continuous forested lands near the wilderness boundary, the potential for escape will be greatest in this alternative because there are no prescribed actions that will reduce fuels.

Alternative 3

Direct Effects:

Campfires will be allowed in Opportunity Class Areas 1 and 2 and it is estimated that the numbers of escaped campfires will increase from 1.5/year (No Action Alternative) to 5/year under this alternative. Subsequently, there will be a resultant increase in acres burned by small wildfires from 0.15 acres per year to approximately 0.5 acres per year. The assumption stated under Alternative 2, Indirect Effects, about large fires applies under all alternatives for the first decade, therefore, it is estimated that approximately 25 acres per year (both small and large fires) will burn by wildfire under this option.

Although the PNF program will be excluded from identified high use areas in this alternative, this alternative comes close to maximizing acres burned (excluding identified high use areas) through the PNF program. It is estimated that 34 acres will burn each year under this program, for the first decade. PNF monitoring is required under this alternative. Management-ignited prescribed fire is maximized under this alternative, and it is projected that a maximum of 100 acres per year will be burned under this program during the first decade (Eldorado side only). Approximately 134 acres per year will burn under these two programs. Between wildfires, PNF and management-ignited prescribed fires, it is projected that 159 acres will burn each year for the first 10 years.

Indirect Effects:

More suppression will be required under this alternative than Alternatives 4 and 5, because lines will be drawn around identified high visitor use areas, and suppression will be required to keep PNF fires outside of these areas.

Over time, it is anticipated that the amount of suppression effort will be reduced under this alternative, as compared to Alternatives 1, 2 and 6 because, as more acreage is burned under the PNF and Management Ignited Prescribed Fire Programs, more barriers (old burns) will be present to stop or slow down fire spread. Suppression forces can utilize these barriers to speed up their efforts, when the need arises.

The element of risk associated with the escape of a PNF or management-ignited prescribed fire is present under this option. So also are the associated damages, that will occur if an escape were to happen.

Cumulative Effects:

Alternatives 3, 4 and 5 have similar benefits as far as acres burned each year, except for the exclusion of PNF from identified high use areas in this alternative. All three of these alternatives tend to maximize the amount of acres burned each year and they will reach the Desired Future Condition sooner than Alternatives 1, 2 and 6. The Desired Future Condition is that, where safe, lightning fires will be allowed to resume their role in the ecosystem.

The risk of stand replacing fires will be reduced sooner under Alternatives 3, 4 and 5. The PNF program will reduce fuel loading annually and so will the Management Ignited Prescribed Fire Program. As a result of these two programs, many barriers (old burns) will be created. In addition, the Management Ignited Prescribed Fire Program will target those stands susceptible to the risk of stand replacing wildfires. Another benefit of this alternative, is that over time, the chance of a PNF fire escaping the wilderness will be reduced, because the prescribed fires that are used around the perimeter (Eldorado side only) will establish barriers to fire spread which will assist in the management of the PNF program in future years. These recent burns will also buffer the affect of a wildfire burning into the wilderness from the outside, and they will provide starting points for using prescribed fire to reduce fuel loading, outside the wilderness boundary in many areas.

By maximizing the Management Ignited Prescribed Fire Program for the first decade (Eldorado side only), it provides the opportunity to analyze expansion of the area where the PNF program can be used, utilizing old burns for barriers, in addition to existing rock outcroppings.

Alternative 4

Direct Effects:

This alternative will encompass the most area inside the PNF program, including the high visitor use areas identified in Alternative 3, thereby reducing suppression efforts over Alternative 3, where PNF fires will have to be kept out of designated high use areas.

Campfires will be prohibited under this alternative, so it is anticipated that approximately 1.5 escaped campfires will occur each year, also reducing suppression efforts over Alternative 3.

All other direct effects are expected to be similar to Alternative 3.

It is estimated that between wildfires, PNF fires, and Management Ignited Prescribed Fires approximately 160-170 acres will burn each year under this alternative.

Indirect Effects and Cumulative Effects:

Indirect and cumulative effects will be similar to those under Alternative 3.

Alternative 5

All Direct, Indirect and Cumulative effects are expected to be similar to Alternative 4.

The annual acres burned between wildfires, PNF fires, and Management Ignited Prescribed fires will be the same as Alternative 4.

Alternative 6

Direct Effects:

As in Alternatives 1 and 2, management-ignited prescribed fire will not be used under this alternative. Due to the lack of management-ignited prescribed fire, approximately 100 acres fewer will be burned each year than in Alternatives 3, 4 and 5.

The PNF effects will be the same as Alternative 4 for the first decade.

Indirect Effects:

Suppression efforts are expected to remain higher under this alternative than in Alternatives 3, 4 and 5, since the control strategy will continue to be used around the perimeter (Eldorado side only) and the PNF program will be confined to the interior of the wilderness (Eldorado side only).

The element of risk and associated damages surrounding an escaped PNF fire is present under this alternative, but it is less than Alternatives 3, 4 and 5 where management-ignited prescribed fire is also used.

The opportunity to utilize management-ignited prescribed fire to achieve the Desired Future Condition is included in this alternative.

Cumulative Effects:

The cumulative effects in this alternative will be similar to those in Alternative 4, except that fuel loading will be greater to the extent that management-ignited fires will not burn inside the wilderness boundaries. Because there will be no opportunity to reduce fuels in areas of continuous forest cover within the wilderness boundary, the risk of fire escape will be greater in this alternative than in Alternatives 3 through 5. This risk can be minimized by reducing fuels outside the wilderness boundary through the use of management-ignited fires and/or other means.

Table 4 - 1

Estimated Acres Burned by Wildfire, PNF, and PF Per Year For Each Alternative *

Fire Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Wildfire	25.5	24.4	24.8	24.3	24.3	24.3
PNF	22.0	0	34.0	17.0	17.0	34.0
PF	0	0	100.0	100.0	100.0	0

* These estimates do not include acres burned outside the wilderness boundaries.

4. Fisheries and Aquatic Resources

Effects Common to all Alternatives

Implementation of the alternatives will affect fisheries and aquatic resources primarily through the management of grazing, fire, recreation use and recreational stock use. There will be no direct effects to aquatic resources due to implementation of any of the alternatives.

Three amphibian species that inhabit or may inhabit the Desolation Wilderness are "Candidate 2" species for federal listing: mountain yellow-legged frog, Mt.Lyell salamander, and Yosemite toad. Mountain yellow-legged frogs have been found in many areas of the Desolation. Mt. Lyell salamanders and Yosemite toads have each been reported at one location in the Desolation in the past. Effects on these three species are discussed below.

Trout are opportunistic predators, feeding on a variety of prey, including zooplankton, aquatic macroinvertebrates, terrestrial invertebrates, and aquatic vertebrates such as amphibians and fishes. Zooplankton and aquatic macroinvertebrate populations can experience severe declines and remain depressed for many years resulting from stocking high densities of trout (Reimers 1958, Nielson 1964). Larger prey species are more vulnerable to predation and shifts to smaller

forms have been observed following stocking of fishless lakes with trout (Walters and Vincent 1973). However, there is no evidence that any invertebrate species has disappeared as a result of trout predation (Nicola 1976). Recent stocking strategies have included reduced stocking densities, which will reduce the effects on invertebrate populations.

Amphibian larvae, on the other hand, are more vulnerable to predation by trout. The elimination of mountain yellow-legged frog populations can, in part, be attributed to introduction of trout in lakes previously devoid of trout (Knapp1994). However, several factors other than trout predation may have contributed to the recent region-wide decline in mountain yellow-legged frog populations including drought, pesticide drift from agricultural areas to the west, and increased exposure to ultraviolet-B radiation resulting from atmospheric ozone depletion. Populations of this species have disappeared from lakes where no trout have been introduced (Fellers 1995). In addition, trout and mountain yellow-legged frogs have been observed coexisting in a variety of lakes and streams within the Desolation Wilderness. Current frog populations in these waters represent densities below reported historical levels, although similar low levels also exist in waters where trout are not present. Yosemite toad and Mt. Lyell salamander populations should be unaffected by trout, as their preferred breeding habitat does not overlap with trout habitat.

Native fish populations are restricted to the lakes and streams of the LTBMU portion of the Desolation Wilderness Area.. Past CDFG lake surveys have identified native fish populations coexisting with trout in several lakes at densities higher than the trout populations. The conclusion drawn from these surveys was that competition from native fishes adversely affected trout populations, especially rainbow trout. The presence of abundant populations of native fishes in several lakes and streams exposed to a one-hundred year history of trout stocking suggests that the effect of trout introductions on the viability of native fish populations has been minor.

Zooplankton and aquatic macroinvertebrate populations will remain at lower levels in lakes occupied with trout. However, the lakes and ponds within the wilderness area that are currently unoccupied by trout provide a variety of aquatic habitats supporting diverse invertebrate populations.

Undercut banks and deep pools are habitat requirements for mountain yellow-legged frogs. Grazing can result in trampled streambanks and a loss of riparian vegetation. These impacts can result in increased erosion, thereby causing changes in stream morphology and reducing the undercut banks and deep pools that are needed by the frogs.

High intensity fires will increase the likelihood of soil erosion and sediment transport into lakes and streams. In severely burned areas, such sediment may reduce habitat for aquatic organisms, including fish, amphibians and invertebrates.

The Forest Service is responsible for the maintenance of streamflow maintenance dams on the LTBMU portion of the Wilderness while the CDFG is responsible for their maintenance on the Eldorado National Forest portion of the wilderness. Loss of the intended function of streamflow maintenance dams resulting from inadequate maintenance and subsequent deterioration will adversely affect fisheries and aquatic resources that depend on a perennial flow in the streams below these structures. Deteriorating dams will also result in decreased lake levels over time. Effects to lake fisheries are unknown, but are expected to be minimal. Lakes are most often at minimum pool levels by fall, so winter lake levels are not expected to change as dams deteriorate.

Alternative 1

Indirect and Cumulative Effects:

This Alternative may provide slightly more protection for fisheries and aquatic resources than Alternative 2, but will provide less protection than Alternatives 3 through 6.The following actions will provide more protection for aquatic species. In areas where natural fires are allowed, the probability of intense wildfires will decrease over time. The implementation of Indicator standards for riparian areas will protect streambanks and lakeshores. Setbacks for campsites and hardening of trail surfaces will prevent erosion, providing protection of water quality. The effects of these actions are expected to be minimal in most years when offset by increased visitor use in many areas of the wilderness. Increases in use are expected to result in increasing numbers of social trails and impacts to lakeshore areas, increasing erosion and decreasing the quality of aquatic habitat.

Increases in use will result in increased angling pressure at most lakes within the wilderness. At lakes where angling pressure increases, fish populations may be reduced, which may result in increases in populations of aquatic invertebrates. However, fish population reduction can be mitigated by alteration of trout stocking allotments. It is unlikely that short term reductions in trout populations will affect the recovery of amphibian populations that have been reduced or lost. Recent surveys of aquatic habitats within the Desolation Wilderness have not indicated recovery of mountain yellow-legged frog populations over a two-year period, even in lakes where no trout are present.

Alternative 2 (No Action)

Indirect and Cumulative Effects:

Implementation of this alternative will result in greater adverse effects to fisheries and aquatic resources than implementation of the other alternatives. However, overall effects are expected to be minimal.

Suppression of all fires will continue to allow the greatest threat of adverse impacts to aquatic habitat from high intensity wildfires. However, effects are expected to be minor throughout the large portions of the wilderness that have low densities of accumulated fuels.

This alternative does not provide Indicator standards to protect riparian areas. Current grazing management will continue. Day use will increase, resulting in increased erosion at lakes near the wilderness boundary which are susceptible to shoreline trampling. Camping will not be restricted in riparian areas, continuing the potential for adverse impacts to aquatic habitat.

Angling pressure will increase with increasing day use at lakes which are easily accessible (within approximately three miles) of the wilderness boundary.

Alternative 3

Indirect and Cumulative Effects:

This alternative provides more protection for fisheries and aquatic resources than Alternatives 1 and 2, but not as much as Alternatives 4 through 6. However, overall beneficial effects are expected to be minor.

A number of actions proposed in the alternative will provide additional protection for aquatic resources. Prescribed natural and planned fires will reduce the possibility of impacts to aquatic habitat due to severe wildfires in some areas of the Desolation. Visitation will lower slightly, thereby reducing impacts due to angling pressure and foot traffic. Removal of campsites in riparian areas and setbacks for recreational stock will provide protection for aquatic species.

Implementation of Indicator standards for riparian areas will provide protection for aquatic resources. This alternative has more Opportunity Class 4 areas than Alternatives 4 through 6, therefore the effect of these standards will not be as great as in the succeeding alternatives.

Cattle will not be herded into several high use lake basins, resulting in reduced impacts to aquatic resources.

Alternative 4

Indirect and Cumulative Effects:

Effects due to fire management are the same as in Alternative 3.

Protection for aquatic resources will increase over that in Alternative 3 due to slightly lower use levels. More acreage within the Desolation will be in Opportunity Classes with more protective riparian standards. Provisions to rest vacant grazing allotments which exceed standards will have a beneficial effect on aquatic resources within those areas.

Alternative 5

Indirect and Cumulative Effects:

The effects of this alternative are similar to those of Alternative 3. However, additional protection of fisheries and aquatic species is provided by additional decreases in use, additional areas protected by stricter riparian standards, and additional removal of sensitive campsites. The closure of the Rockbound allotment will provide continued protection for fisheries and aquatic resources occurring in this area. To the extent that areas of active allotments exceed riparian standards, resting such areas will provide further protection.

Alternative 6

Indirect and Cumulative Effects:

The effects of this alternative are similar to the effects of Alternative 5. Overall effects are expected to be nearly the same.

Prescribed natural (lightning caused) fires will be allowed; however, management ignited prescribed fires will not occur. Due to strict criteria which limit the conditions under which management ignited fire may be used, lack of management ignited fires is expected to have little or no effect on aquatic resources.

Additional protection for fisheries and aquatic resources is provided through further reductions in visitor use and stricter riparian standards associated with Opportunity Classes 1 and 2.

5. WILDLIFE

Wilderness management and wilderness activities generally do not lead to dramatic changes in habitat quality or quantity, except for disturbance to individual animals and the human contribution to stand destroying fires. The effects of the six alternatives on the wildlife resource are therefore closely related to the amount of human presence and associated wildlife disturbance. One measure of potential disturbance is the amount of area in Opportunity Classes 3 and 4, where the amount of human use creates a moderately high to high likelihood of wildlife and human encounters. High numbers of encounters per day and repeated disturbance over time are likely to preclude wildlife use of an area. Certain human activities have the potential to have greater disturbance effects than presence alone. Traveling cross-country, large group sizes, technical rock climbing, recreational shooting, and traveling with domestic dogs can all create greater disturbance effects to wildlife than a single hiker traveling along an established trail. Since most human activities in Desolation Wilderness are centered on overnight camping destinations, the greatest effects of human presence on wildlife occur in lake basins and along the designated trail systems. Certain management activities such as trail construction and maintenance, wildfire suppression, prescribed burning, grazing, and low-level aircraft activities can also affect some species. Following is a brief description of generic effects related to each of these categories with the species most affected by them.

Human presence (traveling cross-country and large group sizes): (northern goshawk, great gray owl, Sierra Nevada red fox, mule deer, black bear, mallard, blue grouse, mountain quail, and golden eagle)

Direct Effects:

The degree of wildlife disturbance related to human presence is dependent upon several factors such as the sensitivity of the wildlife species, season and timing of disturbance, intensity and duration of noise, and frequency of encounters. Some species, such as black bear and mule deer and their young, are more sensitive to human presence and are easily displaced. Disturbance of these species during breeding activities or foraging activities can lead to reduced reproductive fitness or increased exposure to predators. Other species are locally disturbed by human presence and typically respond by moving to other areas and returning when the humans have

left. Most species have a general threshold of tolerance for disturbance. The first few daily encounters have the most disturbing effect. After that, species sensitive to disturbance have likely been displaced so additional use has a negligible effect. Larger groups have a greater disturbance impact due to the greater likelihood of detection by wildlife, especially due to increased noise.

Indirect Effects:

Repeated human disturbance can displace animals from heavily used trails and campsites. Populations of small animals are less affected as their area of disturbance influence is much smaller and may only extend for several feet from a trail, whereas larger animals may avoid areas a quarter of a mile or more from a heavily used travel route. The disturbance distance is greatest in open areas without visual screening. Animals displaced away from these areas may be more vulnerable to predation and mortality.

Cumulative Effects:

In some species, repeated disturbance will lead to altered home ranges that avoid heavily used areas. Larger animals may avoid high quality habitat near heavily used areas and use less optimal habitat in their home range. People traveling cross-country can have a greater disturbance effect since wildlife in remote areas are less acclimated to human presence. The number of people traveling cross country in Desolation is generally low.

Technical Rock Climbing (golden eagle and peregrine falcon)

The effects of rock climbing are common to all alternatives.

Direct Effects:

There are no known existing nest conflicts between golden eagles or peregrine falcons and rock climbing within Desolation Wilderness. The effects are primarily limited to the future potential for conflicts to develop. A slight risk of disturbance can exist if climbing occurs near an active or potential nesting eyrie. Human presence during critical nesting periods (spring and early summer) can prevent these species from establishing a nest site or successfully fledging young. Although specific nest sites and potential nest sites have not been located for golden eagles, this species is highly visible and frequently noted by wilderness users and none have been reported near rock climbing areas. Similarly, potential nest sites have not been identified for peregrine falcon, but the Eldorado and Lake Tahoe Basin LRMPs (USDA 1988b; USDA 1988c) do not anticipate a nesting pair within Desolation. Population recovery as described in the Peregrine Falcon Recovery Plan (USDI 1982) does not depend on the establishment of a nesting pair within Desolation Wilderness.

Indirect Effects:

None identified.

Cumulative Effects:

Rock climbing is largely confined to established routes on specific rock faces.

Even as the sport gains in popularity, new climbing routes are not expected within Desolation as most areas have already been explored and established. Areas well within Desolation are not regularly used for rock climbing primarily due to the weight of climbing gear and the long hikes required.

Current and expected levels of rock climbing under all alternatives are not expected to adversely affect population viability for the peregrine falcon or golden eagle.

Recreational Shooting (northern goshawk, mule deer, black bear, mallard, marten, bald eagle, golden eagle, and osprey)

Direct Effects:

It is believed that there is little direct shooting of non-game species. Some species, particularly mule deer and black bear, are noise sensitive and may be easily disturbed by the sounds of gunfire. Other species such as northern goshawks, golden and bald eagles, and osprey, are less sensitive to noise but may still be displaced from an area following gunfire, probably because the noise draws attention to the presence of humans. The effects of displacement are usually short-term since the number of recreational shooters is small and use is generally sporadic in time, duration, and location. Since marmots may legally be hunted, a slight risk exists for other animals that may be mistaken for marmots, such as the marten. Annual losses to individual species are not expected to be large enough to affect population viability for any target or non-target species.

Indirect Effects:

Predators, such as the golden eagle, are likely not affected by the incidental loss of prey (marmots and other small animals) from recreational shooting. There are no known patterns of annual losses to specific marmot populations; however, marmot populations may be reduced near trails and campsites. The loss of a few individuals annually to recreational shooters will not adversely affect marmot viability within any given area.

Cumulative Effects:

Since most bullets contain lead, there is a slight risk for wildlife to ingest lead and receive lethal or sub-lethal poisoning. There have not been any documented cases of this occurring in Desolation Wilderness, and the sporadic nature of this activity reduces the risk that concentrations of lead bullets may accumulate to affect many animals. The number of recreational shooters is expected to increase proportionally with the number of Wilderness users.

Dogs (Sierra Nevada red fox, marten, mule deer, black bear, mallard, blue grouse, and mountain quail)

Direct Effects:

The presence of dogs in the Wilderness can disturb species sensitive to scents (red fox and mule deer) and those easily chased. Although dogs are known to chase larger wildlife such as deer and bear, there are few reported cases of this occurring within the Wilderness. Instead, dogs are more likely to disturb and disrupt activities of small animals found along trails and near campsites. Dogs may sniff out and flush mountain quail or blue grouse that a lone hiker may not have noticed and will have walked by without causing flight. Dogs are likely to increase disturbance by drawing attention to humans. Much like with recreational shooting though, this disruption and displacement is usually short-term in duration and is not likely to adversely affect population viability of any species.

Indirect Effects:

Dogs are more likely to chase and possibly kill small rodents and ground dwelling animals than the larger threatened, endangered, or sensitive species being analyzed. The sporadic and occasional nature of this disturbance and these losses are not likely to affect these populations and are therefore, not likely to significantly reduce potential foraging opportunities for other predators.

Cumulative Effects:

For most species, the presence of a dog coupled with humans will increase the disturbance potential over that of a human alone. These species may be affected by scent marking by dogs. The number of dogs brought into the Wilderness are expected to increase proportionally with the number of Wilderness users, particularly day users although enforcing leash requirements will likely reduce these numbers.

Trail Construction and Maintenance (all species)

Direct Effects:

The direct effects related to disturbance are very similar to those described for human presence above. The difference is that trail construction and maintenance often requires long periods of intense physical activity within a given area. This amplifies the disturbance effect and can result in longer-term displacement by wildlife. This is especially encountered where crews work within the same area for several days. Trail construction can also involve blasting rocks. Here the effects are likely similar to those described for recreational shooting, except again, the duration of human activity within a given area is often greater with trail construction. New trail construction can also displace or disturb wildlife and reduce available habitat for reproduction and foraging by increasing human presence in new areas.

Indirect Effects:

None identified.

Cumulative Effects:

Trail construction and maintenance can result in increased human presence by making it easier for more people to use trails and distributing higher levels of use to maintained trails. In this case, the effects will be the same as those described for human presence.

Fire (Suppression, Prescribed Burning, and fire effects): All species

Direct Effects:

Fire suppression and prescribed fire management activities have the potential for direct disturbance effects to wildlife similar to trail construction and maintenance. The disturbance is usually a one-time activity that is short to moderate in duration but usually high in activity level. Most wildlife will be directly disturbed during the activity but will return after the activity ceases. Fire management activities during the spring and early summer can disrupt breeding activities for individuals. These activities are sporadic in location, and the potential loss of one years reproduction of a few individuals is not expected to reduce options for maintaining viable populations. Prescribed burning in Desolation will likely occur in the fall, having minimal disturbance effects on wildlife.

Indirect Effects:

Reintroducing fire will improve habitat conditions for species using early and mid-seral stages such as willow flycatcher, mountain quail, and blue grouse. Fire will help perpetuate the grass and brush habitat types. Large stand destroying fires are not expected within most areas of the Desolation due to the discontinuous nature of forested stands and the high elevation (areas where large stand destroying fires may occur include the northeast corner of the wilderness and some areas along the south and west boundaries). Individual stands may be at risk of high intensity fire due to historic fire suppression and fuel accumulations over time. The loss of individual stands to high intensity fire will displace forest species such as northern goshawk, California spotted owl, Sierra Nevada red fox, marten, and black bear until the seral forests become reestablished.

Cumulative Effects:

Reintroducing low to moderate intensity fire will improve the opportunities to maintain late seral forested habitats within the Desolation Wilderness. The amount of forested habitats is limited by natural factors, and is extremely important for most of the species being analyzed. These fuel reducing fires will decrease the effects of large high intensity fires. Such fires cause fragmentation and effectively remove habitat for 200 or more years.

Livestock Grazing (willow flycatcher, great gray owl, mule deer, mallard)

Direct Effects:

Livestock, grazing in meadows and riparian areas, can switch to utilizing riparian deciduous shrubs (primarily willows) in the late fall following heavy frost. This can effect willow age and form class and degrade or prevent the development of willow flycatcher habitat. Willows are also browsed by native species such as mule deer. The effects to willow flycatchers will be limited to meadow systems with minimal human use, perennial water, and the potential to support tall willows. The effects to great gray owls will be primarily limited to the large meadow

systems within the currently vacant Rockbound Allotment. Livestock can also directly disturb wildlife within meadows (mule deer) or within streams or ponds within meadows (mallard).

Indirect Effects:

Annual livestock grazing can change meadow species composition and thereby affect small mammal (vole and pocket gopher) habitat. This can indirectly affect habitat quality for the great gray owl which depends upon vole and pocket gopher populations.

Cumulative Effects:

Current permitted numbers of livestock and current livestock distribution patterns within the Desolation Wilderness have changed substantially over the last 50 years. Historic high concentrations of livestock along well defined stock drives no longer occur. Livestock related effects from historic grazing are still evident within the Desolation, but current numbers are allowing most areas to have an upward trend towards recovery.

Aircraft Operations (peregrine falcon, northern goshawk, mule deer, golden eagle, willow flycatcher, great gray owl, and osprey)

The effects of aircraft operations are common to all alternatives. There will be small differences in the amounts of low altitude Over-flights associated with fire suppression between the alternatives. The effects of these differences are expected to be minor.

Direct Effects:

The existing 2,000 foot above ground level advisory minimizes most direct disturbance to wildlife. Most of the planned Over-flights below this ceiling occur in the early summer when nesting raptors are less sensitive to aircraft disturbances. Most of these activities have been occurring since Wilderness designation. Landing helicopters can disturb wildlife adjacent to the landing location. Since meadows are frequently selected for landing locations, those species using this habitat type (mule deer, willow flycatcher, great gray owl) are more likely to be disturbed. Unless the landing spot is used repeatedly, however, the effects are likely short-termed, and the magnitude of the effects is related to the time of year and sensitivity due to breeding activity.

Indirect Effects:

There are no indirect effects to wildlife from aircraft operations.

Cumulative Effects:

Where planned flights are traditional, wildlife have either adapted to the short-term disturbance or have adjusted their distribution to avoid these areas. It is likely that most species adapt to the short-term disturbance since the use is very limited. Helicopter landing locations are usually related to emergency or other unplanned activities and do not repeatedly occur in the same locations. Thus, they are not expected to have lasting effects.

Alternative 1

Human presence - There will be displacement of wildlife adjacent to heavily used trails and camping destinations in the 50 percent of the Wilderness in Opportunity Classes 3 and 4. Wildlife will be infrequently disturbed in the remaining 50 percent of the Wilderness in Opportunity Class 2. This alternative provides the most potential for wildlife disturbance by having the most area in Opportunity Classes that allow higher densities of people and by allowing the largest group size.

Recreational shooting - There will be a proportional increase in the number of recreational shooters and a slight increase in the number of people shooting at wildlife. Specific local populations of small animals, especially marmots, may be reduced through hunting. However, it is unlikely that local populations will be extirpated and recolonization and population recovery will be expected in one to five years. There will be an increase in the amount of disturbance to species sensitive to noise, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - As with recreational shooting, there will be a proportional increase in the number of people with dogs. Since wildlife disturbance is mostly due to the presence of humans, rather than the dog itself, the increase in the number of people is likely to displace wildlife away from trails and campsites. In the areas with few human encounters (Opportunity Class 2), dogs will contribute to disturbances to wildlife that occurs adjacent to trails and campsites.

Trail construction and maintenance - The addition of new trails and maintenance of existing trails will facilitate the dispersal of wilderness hikers into areas previously little disturbed. Construction and maintenance activities will increase the short-term levels of disturbance and long-term cumulative disturbance will increase along the new trail segments.

Grazing - Livestock numbers will be reduced to meet willow and riparian standards set by Opportunity Class. This will slightly reduce the potential for willow browse. The effects to willow flycatchers will be dependent upon meadows meeting other habitat parameters.

Fire - Some prescribed natural fires will be allowed to burn in remote areas in the fall. These fires will only have a small impact on lowering fuels levels and reducing the effects of high intensity fires. Mature forested habitats will continue to have a net accumulation of dead fuels over most of the Wilderness. The loss of these stands due to wildfire can remove habitat for species such as northern goshawk, California spotted owl, Sierra Nevada red fox, marten, and black bear if they occurred over large areas of the Wilderness.

Alternative 2 (No Action)

Human presence - Wildlife is infrequently disturbed in the 63 percent of the Wilderness in Opportunity Class 2. Wildlife adjacent to trails and campsites in the remaining 37 percent is disturbed by humans on a regular basis and have likely habituated to avoid heavily used areas. Approximately 3 percent of the Wilderness has extremely high use, with most wildlife displaced to other areas. Large group sizes increase disturbance effects, especially in Opportunity Class 2 areas.

Recreational shooting - The number of recreational shooters will increase slightly as day use increases. As with Alternative 1, specific local populations of small animals, especially marmots may be reduced through hunting. However, it is unlikely that local populations will be extirpated, and rapid recolonization and population recovery will be expected. There will continue to be disturbance to noise sensitive species, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - There are few reports of dogs chasing wildlife. Current efforts at educating Wilderness users may decrease the potential for conflicts if compliance increases. Wildlife will continue to be disturbed along trails and at campsites, especially due to scent marking but little direct mortality is likely to occur. In the areas with few human encounters (Opportunity Class 2), dogs will contribute to wildlife disturbance adjacent to trails and campsites.

Trail construction and maintenance - There will be limited disturbance from trail maintenance activities. Maintenance will be scheduled on a rotation basis on most trails, with some areas requiring annual clearing. The potential loss of one years reproduction of a few individuals due to infrequent major trail reconstruction is not expected to reduce options to maintain viable populations.

Grazing - Livestock browse on willows reduces willow habitat quality within some meadows. This may reduce overall habitat quality for willow flycatchers in some meadows, although many meadows with willow do not possess other required habitat parameters.

Fire - Fuel loading will continue to increase in most areas. There will be few opportunities to reduce fuels and lessen the effects of high intensity fires. The risk to loss of mature forested stands will remain high. Such losses will displace forest dependent species for periods of 200 or more years. Helicopters used as a part of suppression efforts will increase the risk of disturbance to wildlife adjacent to landing areas.

Alternative 3

Human presence - This alternative will reduce the area where wildlife and human encounters are frequent. The day use quota in Opportunity Class 4 areas will not have a significant effect on wildlife, as most wildlife is already displaced from these Opportunity Class areas. Approximately 74 percent of the Wilderness will occur in Opportunity Classes 1 and 2. Group sizes in these areas will be reduced, which will further minimize the amount of wildlife disturbance.

Recreational shooting - The number of recreational shooters will decrease slightly proportionate to the decrease in total recreation use, as will the number of people shooting at wildlife. As with Alternative 1 and 2, specific local populations of small animals, especially marmots may be reduced through hunting. However, it is unlikely that local populations will be extirpated, and rapid recolonization and population recovery will be expected. There will continue to be disturbance to noise sensitive species, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - The amount of wildlife disturbance related to dogs will likely decrease over time as Wilderness users are required to leash their dogs. Some Wilderness users will leave their dogs at home instead of leashing them. The effect will be to reduce the number of wildlife encounters with dogs along trails and at campsites.

Trail construction and maintenance - No new trails will be added, and most existing routes will be maintained. Disturbance potential will be reduced along the few trails that will not be maintained and will not show up on maps. Standard trail maintenance will occur, with effects as described for Alternative 3.

Grazing - Livestock numbers may be substantially reduced to meet desired future condition standards for willow browse. This reduction minimizes potential grazing effects to willow flycatcher habitat and results in minimal disturbance and effect to other species.

Fire - Fire management practices will begin to reduce the risk of stand destroying fires in some areas. Prescribed natural fires will be allowed to burn in certain situations, somewhat lessening the number of suppression helicopter landings. Prescribed burning can affect individual breeding animals; however, the long-term benefit of emulating the natural fire regime and allowing fire to play its natural role will outweigh the potential loss of a single years reproduction. Prescribed burns within the wilderness boundary will be strictly limited.

Alternative 4

Human presence - The effects related to human presence are similar to those described for Alternative 3. The quota systems will distribute use more evenly across zones based upon Opportunity Class. Approximately 76 percent of the Wilderness will occur in Opportunity Classes 1 and 2. The day use quota and reduced group sizes in these areas will aid in minimizing wildlife disturbance in Opportunity Classes 1 and 2.

Recreational shooting - The number of recreational shooters will decrease proportionate to the decrease in total recreation use, as will the number of people shooting at wildlife. As with Alternative 1, 2 and 3, specific local populations of small animals, especially marmots may still be reduced through hunting. However, it is unlikely that local populations will be extirpated, and rapid recolonization and population recovery will be expected. There will continue to be disturbance to noise sensitive species, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - The effects will be the same as in Alternative 3.

Trail construction and maintenance - The effects of trail management will be the same as described for Alternative 3.

Grazing - As with Alternative 3, livestock numbers are potentially substantially reduced to meet desired future conditions for willow browse. This reduction minimizes potential grazing effects to willow flycatcher habitat and results in minimal disturbance and effect to other species.

Fire - Fire management practices will begin to reduce the risk of stand destroying fires in some areas. Prescribed natural fires will be allowed to burn in most areas, lessening the number of suppression helicopter landings. These fires may require a prolonged human presence to monitor and manage the fire that can result in more disturbance than will occur under a suppression strategy. Prescribed natural fire and the rare prescribed burn can disturb individual breeding animals, but the cumulative benefit of burning and reducing fuel levels will outweigh the potential loss of a single years reproduction.

Alternative 5

Human presence - As with Alternatives 3 and 4, the overnight and day use quota systems will better distribute use. More area (80 percent) will be in Opportunity Classes 1 and 2 with low human and wildlife disturbance. Group sizes will be reduced in these areas, further minimizing the amount of disturbance.

Recreational shooting - The number of recreational shooters will decrease proportionate to the decrease in total recreation use, as will the number of people shooting at wildlife. As with Alternative 1, 2, 3 and 4 specific local populations of small animals, especially marmots may still be reduced through hunting. However, it is unlikely that local populations will be extirpated, and rapid recolonization and population recovery will be expected. There will continue to be disturbance to noise sensitive species, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - The effects will be the same as in Alternative 3.

Trail construction and maintenance - Wildlife disturbance will be reduced in Opportunity Class 1 and 2 areas as trails are removed. These areas will be less accessible, and use will decrease substantially in some areas in the absence of maintained trails. Use will likely continue in existing travel corridors as they provide connection between popular destinations. Some increase in cross-country travel will occur. The disturbance effect of this cross-country travel will be mitigated by the lessening of effect along former designated trails and by its sporadic nature. Due to lower levels of human use, wildlife will avoid fewer areas in these Opportunity Classes.

Grazing - Livestock numbers are further reduced from the numbers in Alternatives 3 and 4, resulting in even less potential for disturbance or effects to wildlife species.

Fire - Fire management practices will have the same effects as described in Alternative 4.

Alternative 6

Human presence - The entire Wilderness will be in Opportunity Classes 1 and 2.

Wildlife encounters with humans will decrease substantially due to the overall decrease in use and the lower number of human encounters. Most species can use habitats next to trails and campsites.

Recreational shooting - The number of recreational shooters will decrease proportionate to the decrease in total recreation use, as will the number of people shooting at wildlife. As with Alternative 1, 2, 3, 4 and 5 specific local populations of small animals, especially marmots may still be reduced through hunting. However, it is unlikely that local populations will be extirpated, and rapid recolonization and population recovery will be expected. There will continue to be disturbance to noise sensitive species, but the overall low number of disturbance events will not be expected to adversely affect population viability for any of the species.

Dogs - There will not be any wildlife disturbance related to dogs since they will be prohibited.

Trail construction and maintenance - Disturbance will be reduced in many areas as trails are removed. There will be increased disturbance initially as crews remove and obliterate former trails. Some use will continue along these travel corridors, even after the trail is no longer maintained or is removed. The reduced levels of use will allow most wildlife to use these corridors for breeding and foraging habitat. Disturbance from maintenance activities will be limited to major trails in the long-term.

Grazing - The alternative potentially eliminates grazing and effects to wildlife will be similar to those in Alternative 5.

Fire - Fire management practices will have the same effects as described in Alternative 4.

Overall Effect to Threatened, Endangered or Sensitive Species

The six alternatives will not effect the peregrine falcon, bald eagle, California spotted owl, great gray owl, or willow flycatcher due to lack of existing or suspected populations or lack of significant effect to habitats or habitat components. The six alternatives may affect individual northern goshawk, Sierra Nevada red fox, or marten. These species may be affected by direct disturbance. However, there are no known or suspected patterns of disturbance which will lead to a trend towards federal listing or preclude these species from maintaining viable populations within Desolation Wilderness.

6. VEGETATION

Effects Common To All Alternatives

Effects to vegetation within the Desolation Wilderness are generally correlated to livestock grazing, firewood collection for campfire use, camping, trails (construction, maintenance, and use), and fire management practices. Responses to management activities by the ecological groups of potential natural vegetation (PNV) found to occur within the wilderness vary by group.

Effects to vegetation resulting from current or proposed management activities within the Desolation Wilderness include impacts to individual plants and/or modification to habitat components. Effects to vegetation which occur at the landscape level can result in impacts affecting the PNV over the long-term. As PNV defines an acceptable range of variability determined by species composition, any changes that occur to vegetation which are outside of this acceptable range for any of the ecological groups can result in long-term changes to the structure of the vegetation communities. Such changes are likely to be a result of excessive soil

compaction, decrease in regeneration capabilities, fire exclusion, or alteration of hydrologic functions. Changes to elements such as composition can be used to evaluate the effects to factors identified as management implications such as biodiversity (Council on Environmental Quality, 1993), productivity, and fire ecology.

With the exception of fire exclusion, the impacts from management activities that currently or are likely to occur as proposed under all the alternatives, will not have an effect on landscape level PNV. At localized levels, the degree of vegetation changes resulting from these impacts will be noticeable. However, impacts will be minimal at the landscape level and not likely to be measurable. Therefore, implementation of any alternative will not prevent attainment of TRPA's environmental thresholds (1982) for plant and structural diversity, meadow and riparian vegetation, shrub, yellow pine, and red fir associations, forest openings, uncommon plant communities, and sensitive plant communities.

Livestock Grazing

Within the Desolation Wilderness, the types of vegetation communities that may be impacted by grazing are dry and moist meadows, wetland and riparian mixed shrubs, and aspen communities. Grazing activities may affect these ecological groups of vegetation because they provide forage for livestock or are associated with water sources.

Effects will include: utilization of certain plant species such as sedges, grasses, and riparian shrubs, trampling, soil disturbance and compaction, redistribution of nutrients and erosion. These impacts can affect vegetation productivity, vigor, and regeneration, therefore, the composition of plant species, biodiversity and natural succession will be changed. Proper grazing management insures utilization levels to provide species composition and soil conditions appropriate for maintaining or improving the range towards the desired ecological condition.

The implementation of standards and guidelines for those portions of grazing allotments within the Desolation Wilderness, to ensure consistent protection of riparian resources, will provide for a decrease in risk of impacts to vegetation from livestock grazing. The management practices and actions implemented when these desired future conditions are reached or exceeded will reduce impacts associated with grazing and thereby reduce or eliminate impacts affecting vegetation succession.

Firewood Collection

Ecological groups of vegetation which have low productivity levels tend have less available dead wood, and therefore to be the most susceptible to impacts from firewood collection. The lack of trees within some ecological groups or the limited extent of some groups across the landscape also increase their sensitivity to firewood collection. The groups most likely to be affected by firewood collection include dry and moist meadows, aspen, subalpine forests, and sagebrush.

Impacts from live tree cutting and dead and down wood collection decrease the ability of these ecosystems to regenerate over time. In addition, available dead and down wood is necessary for the nutrient cycling process of forest ecosystems, and more importantly, the colonization of ectomycorrhizal fungi. These fungi, which are concentrated in decaying wood, are organisms that develop a mutual association with the roots of most higher plants and improve the plant's ability to extract water, nitrogen, and phosphate from infertile soils. The presence of

mychorrhizae are necessary for the survival of several plants. Depletion of existing decaying wood decreases the levels of mychorrhizae available for productivity, which affects the process of regeneration. As a result, site recovery in these areas can be very slow.

Camping

Impacts on vegetation as a result of camping, both by human visitors and recreational stock, are most likely to occur in ecological groups of vegetation which have highly compactable, shallow, or erosive soils, low regenerative capabilities, low productivity, and in some cases, important wildlife habitat and forage. Dry and moist meadows, wetland shrubs, aspen, and subalpine communities are the most impacted by camping use. Impacts that are likely to occur within these areas are related to degree of proliferation and enlargement of campsites, group size, and length of stay. Vegetation is affected by camping through trampling, vegetation loss, soil compaction, soil and rock displacement, and introduction of non-native plant species through manure or stock feed. Large parties of visitors to the wilderness will disturb a larger area than a small party because they occupy a larger space. Parties with stock will occupy a larger area than comparable-sized parties without stock.

In addition, the presence of domestic pets accompanying camping parties pose a threat to riparian, wet meadow, and subalpine vegetation, in the form of digging and trampling. Such activities can cause erosion, damage to roots of plants, and damage to fragile plants by crushing the woody stems.

Camping impacts can cause permanent vegetation loss as well as resulting in vegetational changes affecting the biodiversity of the areas and the ability of plant species to regenerate on the sites over the long-term.

Trails

Construction, maintenance, and recreational use of trails, both by human visitors and recreational stock, can have varying degrees of impacts on vegetation. These impacts are typically evidenced in ecological groups with erosive, shallow, or highly compactable soils, low regenerative ability of impacted vegetation, steep, unstable slopes, and areas that provide suitable wildlife habitat and forage. Ecological groups which are most affected by these impacts are the moist meadows, wetland shrubs, aspen, subalpine, and talus areas.

The physical soil and vegetative disturbance that accompanies the construction and maintenance of trails, not only in the trail tread but also adjacent to the trail, can displace vegetation and alter the existing plant species composition. Soil compaction or displacement can also occur at that time and reduce the ability of vegetation to reestablish within the disturbed sites. Differences in construction and maintenance levels on trails result in varying levels of impacts to associated vegetation. Type of terrain, difficulty of trail, and type of expected use (such as for recreational stock) can result in differences in trail width and degree of impacts to vegetation likely to occur.

High levels of trail use and user-created trails can cause irreparable damage to vegetation necessary to maintain the stability of an area or impact areas not suitable for such use through trampling, compaction, and devegetation. The degree of impacts are correlated to greater use through increased group sizes and length of stay. Trampling of vegetation can lead to erosion, causing the removal of scarce soil necessary to feed plants as well as protect root systems from

drying wind, freezing temperatures, and radiation. Erosion can also occur as a result of scree slides on unstable slopes through improper visitor use or user-created trails, and can expose roots or smother shoots. The presence of domestic pets accompanying day use hikers will have similar impacts on vegetation as those described for camping.

Fire Management

The ecological groups of vegetation within the Desolation Wilderness are dependent on a variety of fire regimes. For some groups, the pattern and influence of fire on vegetation is a clearly defined and important element of the ecosystem. Lower elevation groups such as Jeffrey pine forests and montane chaparral are positively influenced by the presence of high frequency, light intensity fires. These types of fires are also a natural component of meadow ecology and provide benefits to aspen communities. In contrast, high intensity fires can impact the natural vegetation succession of these ecological groups.

For the ecological groups which occur in the moister red fir and subalpine forests, the presence of fire occurs in less frequent intervals with more variation in intensity and extent. Such fire regimes create mosaics within the landscape, resulting in variable densities and age of vegetation. For some types of communities, fire can have considerable effects on the survival and reproduction of certain vegetation. Such is the case with sagebrush which is killed by moderate to high intensity fire and does not resprout, or lodgepole pine forests which rely on the heat of fires to cause their cones to open quickly and release seeds which then germinate readily on the freshly exposed mineral soil.

The exclusion of fire from vegetation communities which are dependent on fire for succession can alter the biodiversity of these groups. As a result of such fire suppression, when high intensity wildfires occur due to fuel buildups, soil microbe populations, long-term soil productivity, and the successional development of vegetative community structure and composition are impacted.

In contrast, the use of prescribed burning within those vegetation communities, which combine lower temperatures and more frequent fire intervals, provides beneficial effects on plant community development. Conversely, the use of prescribed fire on vegetation within ecological groups which cannot support low to moderate intensity fires can be detrimental to individuals or groups of plants, by affecting survival and reproduction.

Cumulative Effects Common to All Alternatives:

At the landscape level, the differences in impacts to vegetation between the six proposed alternatives will be minor and difficult to measure. It is anticipated that, with the exception of fire management, these impacts will not lead to changes in PNV.

Cumulative effects to vegetation will occur in localized areas within the Desolation Wilderness from implementation of any one of the proposed alternatives. These effects will be due to long-term or permanent reductions in vegetation and alterations in species composition as a result of various levels of management activities described above. Consequently, these impacts will result in a decrease in biodiversity and a decline in vegetation productivity of the wilderness ecosystems. A decrease in biodiversity will have a negative impact on the health of these

ecosystems. A decline in vegetation productivity will delay and reduce the capability of ecosystem recovery from these impacts.

Alternative 1

Direct Effects:

Implementation of this alternative will impact vegetation to a greater degree with regards to grazing, campfire use, recreational use, and trail construction and maintenance, than any of the other alternatives. This is due to the greater use levels proposed in this alternative coupled with less user restrictions.

The effects of grazing on vegetation in the Desolation Wilderness are not completely known. This is due to the lack of recent inventory and information on the condition of allotments. Short-term impacts will occur to vegetation as a result of livestock grazing within the wilderness. These impacts will be within the expected and acceptable range of successional variation if grazed properly. If corrective management practices are implemented through the Allotment Management Plan process, long-term impacts to vegetation from grazing impacts such as trampling, soil compaction and current utilization of riparian shrubs and meadow herbaceous vegetation, will be minimized.

The higher number of allowable visitors (to include day-use, overnight use, commercial outfitter groups, and recreational stock), and lack of restrictions on day-use and camping parameters (to include dogs and setbacks), compared to the other alternatives, will have a greater degree of adverse impacts on vegetation. These impacts will affect vegetation through trampling, devegetation, soil compaction and displacement. As a result, the probability of achieving the desired future conditions for vegetation within Opportunity Class 2 is slight to moderate.

Trail system expansion, improvements, and maintenance levels as proposed under this alternative, will result in adverse impacts to vegetation through soil disturbance, displacement, and devegetation. Adverse impacts to vegetation as a result of trail construction are long-term due to the permanence and continued use of trails. Trail maintenance causes short-term, negative impacts to vegetation during implementation. Long-term benefits, however, will likely result as impacts caused by traffic reroutes to avoid rough or obstructed sections of trail are eliminated through adequate maintenance.

Campfire use throughout the Desolation Wilderness will result in uncontrolled firewood collection, adversely affecting existing vegetation through depletion of dead and down material, cutting of live trees, and a decrease in productivity levels. These impacts will be most evident in those ecological groups sensitive to firewood collection as described above in Effects Common To All Alternatives.

Permitted campfire use throughout the wilderness will also result in an increased risk of escaped campfires. These escaped fires have the potential to increase the chance of wildfires. As a result of these increased risks, fire suppression activities will be expected to increase by 75 percent in this alternative compared to current levels and will be greater than will be expected in the other four action alternatives. Fire suppression activities will affect vegetation through direct displacement or mortality primarily due to fire line construction activities. Subsequently,

impacts to vegetation from fire suppression activities will be greatest in this alternative compared to the other alternatives.

Depending on fire intensity, allowing prescribed natural fires to occur within Opportunity Class 2 will affect some vegetation due to mortality as a result of being burned. It is likely that vegetation within such areas will either recover or reestablish over time. Re-establishment rates will depend on the type of ecological vegetation types affected.

Indirect Effects:

There is a remote chance that the reduction in the use of cow bells will delay the removal of cattle from allotments prior to the onset of wet seasonal climatic conditions or cause an increase in the number of livestock that stray from designated allotments. Should such actions occur, impacts as a result of prolonged trampling and soil compaction or movement into unsuitable forage areas will negatively affect vegetation.

Accelerated soil compaction, erosion, or displacement which occur with increased levels of camping and trail use, improper grazing, or firewood collection, indirectly effect vegetation productivity and composition. Such effects can cause long-term, adverse changes to the biodiversity of an ecosystem and result in not meeting the desired future conditions in Opportunity Classes 2 and 3.

Allowing prescribed natural burning to occur within Opportunity Class 2 will lower fuels levels and reduce risk to vegetation from higher intensity fires within these areas. The degree to which benefits from fuel level reductions through prescribed natural burning within Opportunity Class 2 will occur relative to overall levels of fuels buildup within the wilderness, will be minimal.

There will, however, be an expected increase in potential for large, stand replacing fires resulting from implementation of a prescribed natural burn program under this alternative compared to the current fire management practices within the wilderness. This will be due to the fact that three of the four Opportunity Class 2 areas, in which prescribed fire will be allowed, contain larger areas of continuous fuels. These areas are in the Northeast corner and along the western and southern boundaries of the wilderness. The effects of several decades of fire exclusion in these areas, which have created overstocked, dense, multi-storied forests and continuous old aged brush fields with high dead to live fuel ratios, are the most pronounced in these areas. Should a prescribed natural fire escape in one of these areas, the possibility of its leaving the wilderness is very high. Such large stand replacing fires will have detrimental effects on vegetation and have the tendency to damage fragile ecosystems such as meadows. The rate and components of successional stages resulting from high intensity, large stand replacing fires will be altered.

Cumulative Effects:

With the exception of fire management effects, cumulative adverse effects to vegetation will be greatest under this alternative compared to Alternatives 2-6 . This will be due to the increased levels of use that will occur coupled with less user restrictions, creating more impacts to vegetation through trampling, displacement, and vegetation loss.

Fire exclusion within the wilderness, except where prescribed natural fire is permitted in Opportunity Class 2, will lead to a general change in some of the vegetational components of the

ecosystems in the Desolation Wilderness. Fewer seral stages will result, thereby decreasing the biodiversity of vegetation that occurs with succession over time. Productivity will not be sustained or enhanced in the ecological groups dependent on fire regimes. Due to the fact that some prescribed natural fire will be allowed in Opportunity Class 2, this alternative will have a slightly less amount of negative impacts to vegetation composition due to fire exclusion compared to current fire management practices.

Alternative 2 (No Action)

Direct Effects:

Adverse effects to vegetation which are currently occurring due to heavy recreational use in sensitive areas, such as lakeshores, wet meadows, riparian streamsides, and subalpine woodlands, will continue with implementation of this alternative. These impacts will be less than those that will occur in Alternative One. This will be due to the decrease in this alternative, compared to Alternative One, with regards to visitor group size, allowable stock and outfitter groups, allowable permits issued per day, trail construction and use levels, and firewood collection/campfire restrictions.

All remaining proposed management activities will result in effects similar to Alternative One.

Indirect Effects:

Indirect effects to vegetation as a result of implementation of this alternative will be less, relative to Alternative One, with one exception. The lack of prescribed natural fire use in Opportunity Class 2 will slightly increase the amount of vegetation that will likely be impacted by higher intensity fires. These impacts will decrease to a greater degree the diversity and succession of the ecosystem, relative to Alternative One. The difference in the magnitude of these impacts is minimal, however, due to the amount of land base and types of vegetation that will be affected by the increased risk from fire.

Cumulative Effects:

The cumulative effects will be slightly less than will occur in Alternative One due to reduced levels of visitor use, stock use, and trail construction, and from increased restrictions on camping and firewood collection. Effects from fire exclusion will likely be only slightly more than will occur in Alternative One. This will be due to the amount of land base and types of vegetation that will be affected by the increased risk from large, stand replacing fires.

Alternative 3

Direct Effects:

The reduction in group size numbers, restrictions on visitor use and recreation stock camping, use of a quota system, and increased restrictions on dog control through leashing will decrease adverse impacts to vegetation relative to Alternative Two.

There will be fewer adverse impacts to riparian vegetation as a result of grazing compared to Alternative Two. This will be due to the specific Indicator Standards for willow utilization that will guide the range management in achieving the Desired Future Condition.

The permitted use of campfires within designated areas in Opportunity Classes 1 and 2 will increase adverse impacts to vegetation within those areas compared to Alternative Two. These impacts will result in decreased productivity and regenerative ability within vegetation communities due to firewood collection. In addition, the risk of escaped campfires within these two opportunity classes will increase by 75 percent and result in increased risk of impacts to vegetation due to subsequent suppression activities.

Suppression activities will also likely increase due to restrictions on use of prescribed natural fire by opportunity class boundaries. The need to keep fire out of Opportunity Classes 3 and 4 will necessitate additional suppression measures. These measures will increase risk of impacts to vegetation within Opportunity Classes 1 and 2 compared to Alternative Two.

The emphasis on increasing trail use outside of the wilderness will result in increased adverse impacts to vegetation in the areas in which dispersion will likely occur. These impacts will be long-term as the areas which experience dispersal continue to be used. The degree of impacts will be relative to the amount of dispersion that will occur. With a projected increase in future recreation use within the Tahoe Lake area and Eldorado National Forest, it is highly likely that these impacts will contribute to a downward trend in vegetational structure and composition.

Allowing prescribed natural and planned fire throughout the wilderness will increase short-term, adverse impacts to vegetation as a result of direct mortality from burning, compared to Alternative Two. These impacts will be minimal however, and will be outweighed by the beneficial effects to vegetation that the reduction in fuels will have on reducing likelihood of higher intensity fires.

Indirect Effects:

Indirect effects to vegetation as a result of implementation of this alternative will be less, relative to Alternative Two, with the following exceptions.

The removal of certain campsites, based on social and physical factors, will increase adverse impacts to vegetation should new user-created campsites be created. If removal of certain campsites is successful without the creation of new campsites, long-term negative impacts to vegetation will be reduced. Complete recovery of the sites with regards to revegetation will be based on site location and regenerative capabilities.

Cumulative Effects:

The cumulative effects will be slightly more than those expected to occur in Alternative Two. This will be due to the lack of campfire restrictions within Opportunity Classes 1 and 2, the increase in recreational use adjacent to the wilderness as a result of dispersal emphasis, and the increase in overnight visitor use . In addition, the closure of some campsites has the potential to disperse visitor use to other sites, subsequently adding to cumulative devegetation and soil compaction impacts. Due to the slow rate of recovery for campsites in areas with harsh

environmental conditions and slow regenerative capabilities, it will take decades or more to decrease cumulative impacts that have already occurred on those sites.

Alternative 4

Direct and Indirect Effects:

Impacts to vegetation as a result of camping setback restrictions and management activities relating to fire, dog restrictions, and trails will be similar to those described in Alternative Three.

Impacts as a result of livestock grazing will be decreased in this alternative, due to the use of Indicator Standards. The subsequent resting of allotments when these standards are exceeded will reduce impacts from trampling, soil compaction, and vegetation displacement.

Recreational use impacts due to day-use, camping, and campfire use will be reduced or eliminated in this alternative relative to Alternative Three. This will be due to the reduction in maximum numbers of allowable visitors and groups sizes, and prohibition of campfires throughout the wilderness.

Cumulative Effects:

Due to reduced levels of visitor use and stock use, reduced trail construction, and increased restrictions on camping and firewood collection, the cumulative effects will be the similar to, but slightly less than those described in Alternative Three.

The use of prescribed and natural fire will improve ecosystem health as will the rehabilitation of campsites and trails. A potential decrease in past cumulative impacts through rehabilitation will be dependent on the success of the restoration efforts.

Alternative 5

Direct and Indirect Effects:

Direct and indirect effects to vegetation as a result of implementation of this alternative will be reduced compared to Alternative Four with a few exceptions. Any reduction in effects will be due to the decreased maximum numbers of visitors, group size, stock restrictions, and grazing pressures due to the closure of Rockbound Allotment.

The re-routing of trails in sensitive areas will cause increased impacts to vegetation where the re-routing was to take place. However, these impacts will be minimal and will be offset by the beneficial effects to vegetation that occurs in the sensitive areas where trail use was eliminated.

The requirement for supplemental feed to be carried in for recreational stock will adversely affect native vegetation through the introduction of non-native plant species present in the feed. This impact will be restricted to areas where recreational stock is allowed, however, type of habitat, soils, and moisture availability will influence persistence of non-natives and spread. Risk of this impact will be greatly reduced with the use of certified weed free seed. Impacts to vegetation as a result of this requirement are limited to this alternative; they will not occur as a result of any of the other five alternatives.

Cumulative Effects:

The cumulative effects from this alternative will be the same as in Alternative Four, except the magnitude of adverse impacts will be less due to reduced levels of visitor use, stock use, and trail construction, and increased restrictions on camping.

Alternative 6

Direct and Indirect Effects:

Effects to vegetation as a result of implementation of this alternative will be reduced compared to Alternative Five. This will be due to the decreased maximum numbers of visitors, group size, stock restrictions, prohibition of dogs, removal of all but major trails, and the possible elimination of some livestock grazing allotment portions within the wilderness once they become vacant. All other proposed management activities under this alternative will have similar effects to those described for Alternative Five.

Cumulative Effects:

The cumulative effects will be the same as in Alternative Five, except the magnitude of adverse impacts will be less due to reduced levels of visitor use, stock use, grazing pressures as wilderness portions are eliminated, trail closures, and increased restrictions on camping.

The use of only prescribed natural fire, as opposed to planned and natural prescribed fire in Alternative Five, will improve ecosystem health to a lesser degree in this alternative. This difference between the two alternatives will be minimal.

7. SENSITIVE PLANTS

Effects Common to All Alternatives:

Ground disturbance, soil compaction, and alterations in biotic competition, light, and moisture levels are factors which can affect sensitive plants and their habitats within the Desolation Wilderness. These effects can take two forms: 1) impact to individual plants or 2) the modification of habitat.

The potential effects described below will be similar in all of the proposed alternatives for the management of the Desolation Wilderness, varying only in the degree of risk. The risk of these effects will be proportional to the intensity of use which will occur in the wilderness. As use increases, risk of negative impacts will increase and as use decreases so will potential risk. Any degree of use within the wilderness will result in some risk of impact, even accidental impacts, though in most instances these impacts will be minimal. Therefore, the differences in effects between alternatives will be evidenced in the magnitude of these effects not in the types of effects.

Direct Effects:

Potential direct, adverse effects to sensitive plants from current and proposed management activities within the wilderness will primarily be due to disturbance from trail construction, visitor facility construction, improvements to parking lots and trailheads, camping and recreational use of trails both by visitors and stock, prescribed natural and planned fire, and grazing. These activities can cause physical damage to plants through trampling, soil and plant displacement, and a decrease in the suitability of habitat, resulting in the partial or complete loss of individuals or occurrences.

The likelihood of adverse impacts to Cup Lake draba, Tahoe draba, and long-petaled lewisia is low. This is due to the fact that habitats for these three sensitive plant species are located on steep, talus slopes; in granitic crevices; or in gravelly, snowmelt rivulets. These types of habitats and their locations receive little disturbance from management activities as currently practiced or as proposed within the Desolation Wilderness. Disturbance from recreational use, such as hiking, can cause long-term adverse impacts to plants within these fragile, unstable slopes, however, the degree of use in such areas tends to be minimal and not likely to lead to the loss of entire occurrences. This conclusion is based upon monitoring records for Cup Lake draba occurrences 03-01 and 03-02 (which occurs along and on either side of a trail), and for long-petaled lewisia (Halford, 1995). These monitoring reports have not documented any downward trends in population numbers for either of these species as a result of current wilderness uses, specifically trail use adjacent to these occurrences.

Risk of impacts to hidden-petaled campion is greater than for the above species. This species is negatively affected by soil displacement, compaction, and by physical damage to plants through crushing, trampling, and grazing. The duration and intensity of disturbance will determine the impacts likely to occur.

Livestock grazing will cause direct, adverse impacts to hidden-petaled campion, which occur as a result of trampling and grazing. Trampling (flower stalks are not stout and are susceptible to mechanical damage) occurs when livestock graze or rest in occupied habitat. If this occurs before seed set, the affected plant may not produce a seed crop. Hidden-petaled campion will also be affected by trailing of livestock. This species habitat, the ecotone between the riparian zone and red fir forests, provides for easy travel routes for livestock. Such intense localized trampling can result in local losses of habitat.

Grazing of hidden-petaled campion by livestock will also occur, with affected plants often failing to set seed or producing fewer seeds per plant. This risk is low due to the fact that this plant is not an attractive forage species and, though the plants are occasionally grazed, rarely are all the flowering stems in a occurrence grazed.

The adoption of Opportunity Class Indicator Standards for those portions of grazing allotments within the Desolation Wilderness to ensure consistent protection of riparian resources will provide for a decrease in risk of impacts to hidden-petaled campion occurrences and suitable habitat from livestock grazing. The management practices and actions implemented when these standards are reached or exceeded will reduce the pressures associated with trampling and grazing on this sensitive plant species.

Effects to sensitive plant species and their habitats from the management of fire within the wilderness through use of prescribed planned or natural ignition are expected to be minimal. This is due to the fact that habitats for the sensitive plant species found within the wilderness do not tend to carry fire very well due to lack of fuels and location within moister environments. Cup Lake draba, Tahoe draba, and long-petaled lewisia tend to occur in rocky, open habitats, thereby reducing possible threats from fire to these species. Habitat for hidden-petaled campion occurs in red fir zones and associated meadow edges. Although this habitat type has more fuels than those of the other sensitive plant species known to occur within the wilderness, it does not tend to support intense stand destroying fires.

Effects to sensitive plant species from wildfire suppression activities will also be minimal due to the locations these habitats tend to occur in. In addition, impacts from the construction of hand or mechanical fire lines will most likely not impact entire occurrences of hidden-petaled campion or habitat due to the linear nature of these lines relative to the distribution of plants.

Indirect Effects:

Potential indirect, adverse effects to sensitive plants will be a result of disturbances which alter the suitability of habitat to support sensitive plants. Modification of suitable habitat will not allow for future dispersal and establishment of sensitive plants within these sites, thereby limiting opportunities for increasing the number of stable occurrences necessary to maintain genetic diversity. The duration of effects will vary by the degree of disturbance.

Indirect effects are most likely to be a result of changes in hydrologic functions up-slope from occurrences or suitable habitat, soil disturbance which will cause soil erosion and displacement, introduction of invasive non-native plant species, or changes in canopy structure resulting from fire. Changes in hydrologic functions are primarily a result of management activities, such as trail or campsite construction, which alter water flow patterns or soil stability. Such disturbances will affect associated sensitive plants and habitat, of which all four are dependent on specific water regimes and soil gradients for their continued survival. For hidden-petaled campion, which requires a seasonally moist habitat, a decrease in soil moisture will have detrimental effects on the ability of these plants to survive. The magnitude of this risk is small. For the other three species of concern, changes in patterns of snow accumulation and runoff will have the most affect on their continued survival, from either extreme increases or decreases in the availability of water from snow melt. There is a low risk of such impacts occurring within the habitats of these three species.

Grazing and the use of supplemental stock feed have the most potential for the introduction of invasive non-native plant species through the transport of non-native weed seed. Most non-native plants are highly successful at establishing and out competing native plants for light, moisture and soil nutrients. The establishment of non-natives into a vegetative community can alter the native plant species composition and reduce or eliminate the presence of sensitive plant species.

The best available information indicates that invasive non-native plants are not currently exerting a negative influence on the Desolation Wilderness flora, nor has the introduction of non-natives been documented as a present concern for the occurrences of hidden-petaled campion in the wilderness. Non-native species are uncommon in hidden-petaled campion habitat and there is no indication that cattle are continuing to introduce non-native species to hidden-petaled campion

habitat or that the existence of naturalized non-natives is constraining the vigor of hidden-petaled campion occurrences.

Occurrence and monitoring records for Cup Lake draba, long-petaled lewisia, and hidden-petaled campion within the Desolation Wilderness have not documented fire exclusion as a present concern for these occurrences.

Cumulative Effects:

Current knowledge of cumulative effects from various management practices on Cup Lake draba, Tahoe draba, and long-petaled lewisia is lacking. This is largely due to the fact that these plant species occur in relatively remote areas where accessibility and disturbance is limited. Impacts to these species are primarily a result of recreational use, which is typically low in magnitude in these inaccessible sites. Mining, ski area development, grazing, and horticultural collection are factors which can cause future impacts to these three species throughout their known range.

Cumulative negative effects to hidden-petaled campion have occurred and will continue to occur for some time throughout the known range of this species. These effects are the result of past and present grazing practices, timber harvest practices, and alteration of fire regimes. Within the known range of hidden-petaled campion, the number of occurrences and amount of suitable habitat that have been adversely affected by previous management activities and programs on private and federal lands has not been tabulated. Given the magnitude of these activities during the past 150 years, it is likely that suitable habitat has been degraded, that individual plants have been taken by these activities, and that one or more occurrences have been extirpated. These impacts are primarily evident on plant occurrences on small islands of habitat.

Effects to hidden-petaled campion from livestock grazing are the result of changes in forest structure and composition that have occurred as a result of historic grazing patterns. It is generally recognized that overstocking of the range with sheep in the 1800's resulted in substantial changes in the structure and composition of those plant communities located in the red fir zone. Historic grazing pressures have combined with timber harvest activities throughout the forest to fragment habitat and to create smaller islands of suitable habitat. Populations located on small islands of habitat are more prone to extirpation. Local extirpations may be partly balanced by establishment of new clusters of plants. There is no evidence that the range or distribution of hidden-petaled campion has been restricted as a result of these impacts.

As described above, the direct effects of livestock grazing on hidden-petaled campion are adverse and will contribute to adverse cumulative effects, however, current grazing intensities are reduced relative to historic levels. In addition, new standards and guidelines for range conditions as proposed for the Eldorado National Forest will maintain or improve existing habitat for hidden-petaled campion habitat throughout the forest. The resulting loss of any occurrences or suitable habitat due to historic and current grazing pressure will not result in a reduction in the range or distribution of hidden-petaled campion, nor will any "unique" occurrences be compromised.

Alteration from existing fire regimes also occurred during the 1800's. It is not known what long term effects to the habitat of hidden-petaled campion these impacts have had. It is difficult to separate these impacts from those generated by logging practices and grazing. Due to the fact

that hidden-petaled campion habitat probably experienced a fire regime with longer fire return intervals than those common to drier sites, the effects of fire suppression may be less intense relative to more fire prone sites. It is not known what the impact of recent (post-1940) fire suppression and prescribed fire activities has been on hidden-petaled campion habitat.

There are future management activities planned throughout the known range of hidden-petaled campion. These projects include timber harvest, fuels reduction, prescribed burning, vegetation control, construction of roads and trails, and construction of landings, parking lots, and recreational use facilities. Adverse impacts to sensitive plants from recent (1989-1994) management activities have been minimized largely by the use of avoidance.

Avoidance or other means of mitigating impacts on sensitive plant occurrences is consistent with direction contained in the Standards and Guidelines for Sensitive Plants of the Land and Resource Management Plans for both the Eldorado National Forest and Lake Tahoe Basin Management Unit to include: 1) "provide for the protection and habitat needs of sensitive plants so that Forest activities will not jeopardize the continued existence of such species" (ENF P.IV-91), and 2)"assure that existing habitat of these plants is adequately protected and that additional habitat is provided to perpetuate the species" (LTB P.IV-28). Therefore, proposed activities under all alternatives will not likely harm, destroy, or otherwise jeopardize these three sensitive plants or their habitat, thus meeting TRPA's environmental thresholds for sensitive plants.

Implementation of any of the proposed alternatives will not contribute to cumulative effects on hidden-petaled campion. This conclusion is supported by the fact that within the known range for this sensitive plant, there are adequate recorded occurrences (over 200) with the estimated numbers and distribution of reproductive individuals to ensure the continued viability of this species throughout not only its existing range but also throughout its range within the Desolation Wilderness. In addition, sensitive plant surveys within the known range of this plant continue to locate new occurrences which appear to be vigorous and reproductive based on the numbers of plants present, the extent of areas covered by the plants, and the number of seeds and newly developed plant clusters produced in the occurrences.

Effects Common to All Action Alternatives:

Specific management direction common to all action alternatives has been developed which requires that surveys for sensitive plants will be performed prior to project implementation for any ground disturbing management activities. In addition, project specific Biological Evaluations will be completed at which time site by site impact analysis for all of the sensitive species of concern will be fully addressed. At such times, it is possible that project specific analysis will determine effects which may not be reflected in this present analysis. Appropriate prescriptions for the protection of sensitive plant species and their habitat will be determined at that time, and additional mitigation measures will be developed if necessary.

The above management direction and the management prescriptions as outlined in the interim species management guides for long-petaled lewisia and hidden-petaled campion, will greatly reduce risk of impact for all areas known or found to support any of the four sensitive plant species of concern for all of the action alternatives. In the circumstances where ground disturbing management activities will occur outside of the wilderness to emphasize alternative recreational areas and opportunities and to relieve recreation pressures inside the wilderness, these management directions and prescriptions will also be applied. Adverse effects to sensitive

plant occurrences will therefore be avoided or reduced to such an extent that the viability of each known occurrence and subsequently the viability of each species will be maintained under all of the action alternatives.

There exists the potential for risk of accidental impacts to sensitive plants despite the use of the above management direction and prescriptions. Accidental impacts likely to occur will be similar to those described above for direct and indirect effects common to all alternatives. Should such impacts occur through accidental actions, individual plants or entire occurrences will be negatively affected.

It is anticipated that these impacts will likely be minimal due to the nature of the proposed management direction providing for specific NEPA documentation and project analysis. In addition, this direction, coupled with the present accuracy and availability of Sensitive Plant Program atlases and files, will reduce the risk of accidental negative impacts to sensitive plants.

Alternative 1

Direct Effects:

The increased recreational opportunities and decrease in restrictions and limits on use will increase the risk of long-term, adverse effects to sensitive plants and habitat within the wilderness as compared to current management practices (Alternative 2) due to the following: 1) the increase in trails, parking, or other recreational use improvements, 2) the absence of restrictions on recreational stock use areas, and 3) the greater number of allowable groups and group size. All of these factors increase the recreational opportunities within the wilderness and allow for more visitor use. Impacts likely to occur as a result of increased recreation use will be trampling of plants and a decrease in habitat suitability from soil compaction and disturbance. Although difficult to predict or quantify, these effects are not expected to be substantial.

Indirect Effects:

Indirect effects to suitable sensitive plant habitat will likely increase under this alternative relative to current management practices, through improvements to trails, trailheads, parking facilities, and visitor facilities.

Disturbances to suitable habitat as a result of these improvements will be adverse and long-term. These disturbances will be a result of habitat alteration through soil compaction, vegetation loss, canopy changes, and soil displacement. As these areas will continue to be maintained for optimum recreational use, they will cease to provide the habitat characteristics necessary to support sensitive plants, thereby lessening opportunities for recruitment and establishment of sensitive plants within these areas. The low probability of suitable habitat for Cup Lake draba, Tahoe draba, and long-petaled lewisia within the areas likely to be impacted by such improvements, reduces the risk of impacts to these three sensitive plant species. Although difficult to predict or quantify, these effects are not expected to be substantial.

Cumulative Effects:

Cumulative effects to sensitive plants are addressed under Effects Common To All Alternatives.

Alternative 2 (No Action)

Direct Effects:

Current management practices are not having, nor are they likely to have, a negative, long-term direct effect on sensitive plants and their habitat. Based on monitoring reports for Cup Lake draba, Tahoe draba, and long-petaled lewisia, current management practices are not causing a decline in individual plant numbers within known occurrences in the wilderness. It is also believed that the occurrences of hidden-petaled campion within the wilderness have the estimated numbers and distribution of reproductive individuals needed to ensure the continued existence of this species throughout its range within the wilderness. In addition, new occurrences of this sensitive plant continue to be discovered within the wilderness during project planning surveys. Five new locations were discovered in 1991 during trail reconstruction reconnaissance.

Short term, negative impacts to individual plants of sensitive species are likely to occur as a result of continued current management practices. These impacts will be due to disturbance factors which occur as a result of implementation of trail construction, visitor facility construction, improvements to parking and trailhead, recreational use of trails both by visitors and stock, grazing, and fire suppression activities. Plants and habitat may be inadvertently destroyed, trampled or altered during any of the above mentioned activities. Impacts will be minimal, however, due to the limited amounts of disturbance activities likely to take place under the current wilderness management direction in relation to the amount and location of suitable sensitive plant habitat.

Indirect Effects:

Indirect effects to sensitive plants from present management practices within the wilderness are expected to be minimal. For Cup Lake draba, Tahoe draba, and long-petaled lewisia this will be due to the remoteness of their habitat and the low likelihood of impacts occurring within such habitats. For hidden-petaled campion, this is due to the fact that the continuum of habitat for this species within the wilderness is likely to remain stable as a result of present management practices. Any changes to habitat which are likely to occur as a result of disturbance factors will affect relatively small portions of the landscape. These impacts will be a result of disturbance factors which alter the suitability of habitat to support sensitive plants. Modification of suitable habitat will not allow for future dispersal and establishment of sensitive plants within these sites, thereby limiting opportunities for increasing the number of stable occurrences necessary to maintain genetic diversity. The duration of effects will vary by the degree of disturbance.

Effects will be long-term if sensitive plant habitat suitability is permanently altered by the disturbance. If the disturbance factor is temporary and the habitat is allowed to recover to predisturbance suitability, the reproductive capabilities of this species will allow it to reestablish within suitable habitat over time. The negative effect as a result of temporary disturbance will therefore be short-term.

Cumulative Effects:

Cumulative effects to sensitive plants are addressed under Effects Common To All Alternatives.

Alternative 3

Direct Effects:

Direct adverse effects to sensitive plants within the wilderness will be similar to those described under Alternative Two. Impacts to sensitive plants and habitat outside the wilderness, however, will increase under this alternative. This is due to the fact that emphasizing areas for use outside of the wilderness opens opportunities for greater risk of long-term impacts to individual plants and habitat outside of the wilderness. These impacts will be a result of trampling and habitat alteration resulting from visitor use, recreational stock, and trail improvements. These impacts, however, will be minimal due to the degree of proposed activities in relation to the amount and distribution of suitable sensitive plant habitat outside the wilderness which will coincide with increased use areas.

Indirect Effects:

Indirect adverse effects to sensitive plants outside of the wilderness will also increase under this alternative. As more areas are opened up for recreational use, disturbance factors will alter habitat and reduce the suitability of these areas for recruitment and establishment of sensitive plants over time. The duration of these impacts will be similar to those described in Alternative Two. Although difficult to predict or quantify, the effects are not expected to be substantial.

Cumulative Effects:

Cumulative effects to sensitive plants are addressed under Effects Common To All Alternatives.

Alternative 4

Direct and Indirect Effects:

Direct and indirect, adverse effects to sensitive plants within the wilderness will be decreased through implementation of this alternative relative to Alternatives One, Two, and Three. This will be due to the reduction in visitor group size, restrictions on recreational use patterns and recreational stock use areas, and elimination of campsites within riparian areas. Trampling, grazing and alteration of habitat associated with these factors on sensitive plants will thereby be reduced or eliminated. In addition, the closure of Rockbound Allotment will reduce risk of impacts due to grazing, trampling and alteration of habitat on hidden-petaled campion.

Long-term impacts to individual plants and habitat outside of the wilderness, will be similar to those described for Alternative Three.

Cumulative Effects:

Cumulative effects to sensitive plants are addressed under Effects Common To All Alternatives.

Alternative 5

Direct and Indirect Effects:

Direct and indirect effects to individual plants and habitat of sensitive plants are similar for this alternative as those described in Alternative Four with two exceptions. The additional decrease in visitor use numbers proposed in this alternative compared to Alternative Four will subsequently decrease risk of impact to sensitive plants and their habitats to a greater degree than in Alternative Four.

Cumulative Effects:

Cumulative effects to sensitive plants are addressed under Effects Common To All Alternatives.

Alternative 6

Direct, Indirect, and Cumulative Effects:

Effects to sensitive plants as a result of implementation of this alternative are similar to those described for Alternative Five, except the magnitude of adverse impacts will be less due to reduced levels of visitor use and increased use restrictions.

8. HYDROLOGY AND WATER QUALITY

Potential impacts to water quality in lakes and streams include impacts due to short-term acidification episodes, runoff from trails and campsites, poor sanitation practices, and channel degradation and sedimentation associated with grazing management. Nutrients and sediment contained in runoff from heavily used campsites and grazing allotments have the potential to jeopardize the unique clarity of lakes within the Wilderness.

Effects common to all alternatives:

Direct Effects:

Fire can have significant effects on water quality and quantity. For all alternatives, despite prescribed and natural burning, there will still be a risk of severe, high intensity fires. When fire severely burns a landscape, loss of the protective duff and litter layer from the forest floor can greatly increase the rate of soil erosion and the likelihood of highly erosive overland flow. Loss of vegetation due to fire can increase sub-surface water by decreasing the amount of water that is evaporated from or utilized by plants, leading to a potential for an increased frequency of mass soil movement. This may lead to increased streamflow from burned areas including increases in peak flows, and greater likelihood of soil erosion and sediment transport to lakes and streams.

The likelihood of severe effects of fire on water resources increases with fire intensity. Fire intensity in controlled conditions such as prescribed burns are designed to burn at less intense rates, and generally will have less impacts on soil erosion and sedimentation than high intensity

wildfire. Most of the Desolation Wilderness is not susceptible to large, severe fire since it is either sparsely vegetated or barren. Several areas, especially the eastern portion of the Wilderness which drains to Lake Tahoe have contiguous forest stands that will, if burned severely, pose a significant threat to water quality in streams and lakes within these drainages. Included in these areas are Meeks, General, and Falls Creek drainages. Smaller, intense fires that consume less contiguous forested areas may cause more localized erosion adjacent to high elevation lakes and streams.

Impacts from trails (including user-created trails), and campsites include soil compaction, loss of vegetation and soil cover, and increased erosion. Decreased soil infiltration associated with trails and campsites can concentrate water runoff and cause sheet rills and gully erosion. In some cases, runoff may flow directly to lakes or streams. Water bars which are maintained on developed trails and monitored occasionally for effectiveness will mitigate impacts associated with trails. Impacts from recreational stock use vary in magnitude for each alternative. Stock use on trails may increase the likelihood of erosion from trails by creating additional compaction. In other areas, dry soils may be loosened by hoof action, and then easily mobilized by runoff. On trails used by stock, durable waterbars which are regularly maintained and appropriately located will reduce erosion problems.

Indirect Effects:

Effects of fire on erosion and sedimentation rates can persist for many years after the fire occurs. The extent, frequency, and magnitude of erosion and sedimentation depend primarily on how quickly vegetative cover is re-established on burned areas and persistence of soil hydrophobic layers. Indirect effects of fire on watersheds include increased sedimentation and erosion, increased mass wasting, channel aggradation and widening, consumption of woody debris within stream channels, and increased peak flows. Loss of root strength from burned and dead trees located on potentially unstable slopes will eventually occur, causing further risks of mass wasting. Landslides related to the loss of vegetation can occur several years after a severe fire. Rainstorms following severe fire have the potential for mobilizing and transporting sediment as long as soils remain unvegetated or hydrophobic. Sediment eroded from severely burned areas may aggrade stream beds, adversely affecting channel stability which reduces habitat for aquatic organisms.

Indirect effects from trails and campsites will be similar to the direct effects discussed in the Direct Effects section. Sediment eroded from upland sources such as trails and camping areas may be routed to streams and transported to downstream areas, or may cause sedimentation in lakes.

Cumulative Effects:

Cumulative effects of wildfire include long-term increases in sedimentation in streams and lakes, geomorphic changes in stream channels that may become clogged with sediment, alterations of streamflow regimes, and changes in the routing of sediment and nutrients. These impacts may have large impacts on downstream beneficial uses such as reservoir storage and the clarity of lakes including Lake Tahoe. These impacts may persist for decades in certain areas. The potential for a large stand replacing fire in Desolation Wilderness has increased in recent years due to several years of drought. Dry weather has caused extensive mortality of certain tree species, especially in lower elevation areas adjacent to the northeast corner of the Wilderness, or

where forested stands within the Wilderness are contiguous with other forested lands. Fire ignition in these areas will easily spread upslope to large forested portions of the Wilderness. Prescribed burning will help to alleviate the risks of a large, stand replacing fire and the cumulative, direct, and indirect effects on watersheds.

Cumulative effects of trails, campsites, and grazing in the Wilderness have been qualitatively assessed using a screening process developed by Leven (1990) and adapted for use in wilderness settings (Farley 1994a). Cumulative Watershed Effects (CWE) is generally a measure of potential sediment yield and soil erosion within watersheds caused by human activities. The process rates CWE based on factors such as watershed sensitivity to disturbance, campsite density, trail density and grazing impacts. Watersheds in which most of these CWE factors rated "high" are most likely to approach threshold levels and produce unacceptable amounts of sediment and erosion. An analysis of the risk of CWE was done for most watersheds within the Wilderness. The risk was quantified with a numerical rating. After this risk screening process was completed (Farley 1994b), the Wrights' Lake watershed was determined to have the highest risk of CWE compared to other watersheds within the Wilderness. Additional analysis of this watershed utilizing the USFS Region 5 CWE process, as recommended by Carlson and Christiansen, 1993, revealed that the risk of CWE was actually low when all the factors affecting sedimentation and erosion rates were considered (Christiansen 1995). Since the analysis indicated that all other major watersheds within the wilderness have a lower risk of CWE than Wrights Lake, it follows that all other watersheds within the Wilderness will also have a lower likelihood of CWE.

Alternative 1

Direct effects:

In this alternative, prescribed natural fire will only occur in remote areas. This should help mitigate the fuel buildups in these areas, and thereby reduce the potential for significant sedimentation and erosion due to large stand replacing fires. Risks to watersheds under this alternative will be less than in the Alternative 2, but greater than in Alternatives 3-6. Potential direct effects from fire are described in the Common to All Alternatives section.

Human sanitation problems may result from the use of backcountry toilets. Backcountry toilets concentrate human waste, and if not designed properly, can leach material to subsurface water where it may eventually reach streams or lakes. If toilet facilities were properly designed and maintained, sanitation will generally be better under this alternative than in Alternative 2. Generally, the use of backcountry toilets will mitigate the effects of improper sanitation from more human use of the Wilderness. Grazing impacts to watersheds will be less than in Alternative 2. The implementation of Indicator Standards for grazing will provide increased protection for sensitive areas by adjusting timing and extent of grazing periods based on a number of physical and biological factors. Effects on watersheds from trails, camping areas, and fire rings will generally be less than in Alternative 2. Hardening campsites near water and 100' camping area setbacks will decrease the likelihood of sediment eroded from campsites reaching surface water. Fire rings will be designated, so fire use will not be spread out over large areas. Trails will be expanded, but with good construction and maintenance practices (such as providing adequate drainage and locating trails away from streams and lakes), erosion from additional trails should be minimal.

Indirect Impacts:

Indirect impacts from fire under this alternative will be less than in Alternative 2. Less risk is likely for the same reasons discussed in the Direct Effects section.

Indirect effects from human sanitation problems will be similar to the direct effects discussed previously. Indirect effects from grazing may occur, however they are expected to be much lower than in Alternative 2 (No Action) due to the increased protection for sensitive areas provided through implementation of Indicator Standards. Indirect effects from trails, campsites, and fire rings will also be similar to direct effects.

Cumulative Effects:

Possible cumulative effects from fire were discussed in the Common To All Alternative section. Cumulative effects from fire will be less than the No Action Alternative for the same reasons given in the Direct Effects section under this alternative.

Little long term cumulative effects will result from human sanitation problems. Potential cattle grazing related cumulative effects are discussed in the No Action Alternative section. Trails, campsites and fire rings will cause very little cumulative downstream sedimentation over time.

Alternative 2 (No Action)

Direct Effects:

Suppression of fires under this alternative will lead to increased fuel build-ups. This will lead to higher likelihood of severe fire over time compared to the other alternatives, and risks to watersheds from fire may be the greatest under this alternative. Direct effects resulting from fire are discussed in the Common to all Alternatives Section.

There will be a moderate risk of causing water quality problems from inadequate human sanitation under this alternative. Runoff adjacent to lakes and streams can transport human waste and associated pathogens to streams and lakes, resulting in gastrointestinal distress to those drinking untreated water. The 100 ft camping and human waste disposal setback from water called for in this alternative will lead to a moderate risk of water quality impacts. Due to steep terrain surrounding some lakes, proper sanitation may be difficult because of limited accessibility to areas where waste may be properly disposed. The numbers of people visiting these sites will influence the amount of waste that is generated. The amount of visitor use under this alternative will pose a moderate risk of affecting water quality. Continued monitoring of fecal coliform organisms will help ensure adequate management of sanitation.

Cattle grazing will continue in the Wilderness under current management direction provided the Eldorado LRMP and in grazing permits. Cattle grazing can directly affect the amount of harmful bacteria present within streams that drain grazed areas. This effect will be relatively short-lived (i.e. weeks). Cattle grazing in riparian areas can directly reduce streamside vegetation and stream shading. This may lead to higher stream temperatures within affected streams. Also, loss of vegetation near streams from grazing can directly increase streambank instability and gullying or stream widening.

Indirect Effects:

Indirect effects from fire are summarized in the Common To All Alternatives section. All fires will be suppressed under this alternative. Fire suppression may reduce sedimentation in watersheds for the near future. However, long term fuel buildups in certain watersheds may lead to increased likelihood of large, stand replacing wildfires. Because other alternatives reduce the likelihood of such fires, the sedimentation and erosion due to fires will be greatest under this alternative.

Pathogens from human waste may persist in surface water for several months. Periodic rainstorms or snowmelt runoff may transport this material to lakes and streams. Indirect effects from improper disposal of human waste will depend on the waste material being transported to streams and lakes during rainstorms or snowmelt runoff.

Cattle grazing can indirectly affect the water quality of downstream areas. Pathogens generated from cattle dung can be transported downstream considerable distances. Upland areas affected by cattle grazing may contribute increased sediment to runoff by decreasing ground cover in sensitive areas and actively increasing the abundance of sediment source areas.

Cumulative Effects:

High intensity fire can cause chronic sedimentation of streams that can persist for decades. The previous discussion in the Common to All Alternatives section discusses the possible cumulative effects of fire. The likelihood of high intensity fire under this alternative is discussed in the Direct Effects section.

Cattle grazing may cause cumulative effects on streams and meadow systems. Local downcutting and widening of streams can occur as a result of cattle grazing alongside streams and in riparian areas. Downcutting of stream channels has been shown in other high mountain meadow systems to cause de-watering of wet meadows, and eventual displacement of meadow vegetation with upland species such as sage or tree species. Displacement and lack of recruitment of woody riparian plant species such as willow due to grazing by wildlife or cattle may eventually lead to less stable streambanks in grazed areas.

Effects from human waste are probably not cumulative over time, as materials will decompose over time.

Alternative 3

Direct Effects:

Direct effects of fire in this alternative will likely be reduced when compared to Alternative 2. Fuels will be reduced over time through the use of prescribed fire, reducing the likelihood of severe fire and subsequent watershed disturbance. Prescribed fire will be allowed in all areas under this alternative, allowing for more versatility in treating fuels. Under this alternative, the direct effects of fires that do occur will be similar to those described under the Common to all Alternatives section.

Human sanitation problems under this alternative may be reduced slightly over the no-action alternative. Overnight visitation will be reduced by 17 percent and day-use will be restricted, and 200 ft setbacks from water for human waste disposal will add additional protection to surface water. Direct effects from grazing will be less than in Alternatives 1 or 2. Application of Range Indicator Standards for willow use, trampling and chiseling of streambanks will result in increased opportunity for recovery of resource damage on Wilderness allotments.

Trails, campsites, and fire rings will pose slightly less risk to watersheds, since trails through sensitive areas will be re-routed and some campsites near water will be removed.

Indirect Effects:

The relative risk to waters from high intensity fire is discussed in the Direct Effects section under this alternative, and indirect effects of fire are discussed in the Common To All Alternatives section. The indirect effects of human sanitation problems will be similar to direct effects. Grazing effects will be similar to Alternative 2. The indirect effects of trails, campsites and fire rings will be similar to direct effects.

Cumulative Effects:

Potential cumulative effects from this alternative are discussed in the Common to all Alternatives section. The risks of wildfire are discussed in the Direct Effects portion of this alternative. Cumulative impacts on sensitive areas will be reduced by implementation of herding strategies to keep cattle out of specific lake basins and areas receiving high recreation use.

Alternative 4

Direct Effects:

Direct effects to watersheds from the implementation of this alternative are similar to alternative 3. Risks from high intensity wildfire will be about the same as discussed in alternative 3, since prescribed burning is allowed in all areas.

A decrease in human sanitation problems may be encountered over time, since overnight visitor use will be reduced by 30 percent from the No Action alternative, and a 200 foot setback for human waste disposal will be implemented. Also, physical restoration of disturbed areas will help to reduce erosion from these areas and transport of sediment into streams and lakes.

In this alternative, grazing impacts to streams will be less than in Alternatives 1, 2 or 3. The potential for grazing impacts will be further decreased by protecting sensitive lakeshore areas through implementation of herding strategies in years of low precipitation.

Indirect Effects:

Indirect effects of implementing this alternative are similar to indirect effects in Alternative 3. These effects will be mitigated by restoration and reduced visitor use. Removal and restoration of campsites in sensitive areas will decrease the likelihood of direct effects from surface water erosion. Indirect effects from grazing are expected to be similar to those in Alternatives 1 and 3.

Cumulative Effects:

Cumulative effects of this alternative are similar to Alternative 3. Sedimentation from compacted campsite areas will be slightly reduced under this alternative because of active restoration. Cumulative impacts on sensitive areas will be reduced by implementation of herding strategies in years of low precipitation

Alternative 5

Direct Effects:

The direct effects from fire are similar to those in Alternative 3, since fire frequencies and extent will be about the same. Human impacts may be reduced compared to the no-action alternative since overnight visitation will decrease by 43 percent. This will result in less human induced impacts such as campsites, social trails and human waste. Human impacts such as campsites and sanitation problems will be reduced as a result of using designated camping areas and 200' setbacks for the disposal of human waste. Furthermore, some trails will be re-routed from sensitive areas which may slightly reduce the risk of sedimentation from trails. Some trails will be kept in a more primitive state, which may lead to increased sedimentation due to lack of adequate trail maintenance and drainage.

Grazing impacts will be the same as described in Alternative 4. Potential direct effects are described in the Common to all Alternatives section.

Indirect Effects:

Indirect effects from the implementation of this alternative are similar to Alternative 4. Possible indirect impacts are described in the Common to all Alternatives section. Human impacts such as campsites and sanitation problems will be reduced as a result of using designated camping areas and 200 foot setbacks for the disposal of human waste.

Cumulative Effects:

Cumulative effects from the implementation of this alternative are similar to Alternative 4. Compacted areas will be reduced slightly, and riparian areas will be revegetated, resulting in less risk of sedimentation in streams and lakes.

Alternative 6

Direct Effects:

Direct effects from fire are similar to those described for Alternative 3. This alternative will be the most effective at reducing the impacts to water quality from human sanitation. Visitor use will be reduced by up to 62 percent from the no-action alternative, resulting in fewer visitor impacts such as compacted soil around campsites. Impacts from human waste will be nearly none, since all waste will be packed out. Revegetation of disturbed sites will help to mitigate the risks of sedimentation from compacted areas. However, trails will be maintained in primitive

condition. This may not ensure that adequate trail drainage will be constructed and maintained, again posing a risk of sedimentation to streams and lakes.

Grazing impacts will be the same as in Alternatives 4 or 5, except that this alternative will allow the resting of the wilderness portion of allotments (at the time of permit renewal) if resource damage is occurring. Resting allotments can help restore stream morphology and eliminate or reduce sediment sources, allowing stream channels to recover faster from grazing impacts.

Indirect Effects:

Indirect effects of this alternative are similar to those described in Alternative 4, except for impacts resulting from fire, which are more similar to those described for Alternative 3. Indirect effects of fire are discussed in the Common To All Alternatives section.

Cumulative Effects:

Cumulative effects from the implementation of this alternative will be similar to Alternative 4, except for the effects of fire which will be more similar to Alternative 3. Compacted sites in sensitive areas will be restored, resulting in less risk of sedimentation in streams and lakes. Risks of cumulative effects will be significantly less than the no-action alternative. Certain campsites will be restored, and riparian areas will be revegetated, resulting in a lower risk of sedimentation to surface water.

B. HUMAN COMPONENTS OF THE ECOSYSTEM

1. HERITAGE RESOURCES

Effects Common to all Alternatives:

The level of archaeological survey for Desolation Wilderness is very low. Thirty to forty percent of the total acreage is archaeologically sensitive, but only 1percent has been surveyed. Most survey work has been limited to areas in lake basins associated with campsites and along major trails. The limited survey, however, has identified 26 archaeological sites. (There are an additional 52 sites which have been identified through literature review.) Table 4-1 lists the 26 sites identified during survey, their current impacts, integrity, and eligibility for the National Register of Historic Places (NRHP). These sites represent both prehistoric and historic use of the area. It is highly probable that similar types and comparable numbers of archaeological sites will be identified if survey is expanded in the project area. For example, an additional 52 sites which have been documented through literature reviews wait to be field checked by an archaeologist to determine the nature and condition of their remains.

Prehistoric and historic human land use, in many instances, is intertwined with access to natural resources. Indeed, many of the archaeologically sensitive areas of the wilderness are overlaid by areas that are also attractive to contemporary recreational and range use. The existing environment in Desolation Wilderness is the sum of prehistoric, historic, and contemporary events. Consequently, any effects to the environment can only be properly analyzed in light of all three components. Two of the three components; however, are poorly understood. First, there is a gap in our knowledge of past human activity in the project area. Second, contemporary Native American use and/or cultural value of the area is not known. Regardless of the current lack of information, all appropriate survey and inventory data will be collected prior to the implementation of any site specific project. If evaluation of survey data identifies an issue of concern, mitigation measures to adequately protect cultural resources will be implemented prior to the initiation of any specific project.

In all the alternatives, archaeological sites in Desolation Wilderness may be affected. The extent of these effects is uncertain. Site integrity, however, can be expected to continue to degrade through cumulative impacts resulting from continued use of the area by people. The effects of camping and pedestrian/equestrian trail use include vandalism, illegal collecting, trampling of sites and artifacts, breakage of artifacts, and the random dispersal of surface artifacts. Continued grazing on active allotments will also result in effects due to trampling of sites. The listed effects can permanently alter the character of sites, including their ability to provide information relevant to regional scientific research. In recognition of these circumstances and considering the ideals of preservation associated with wilderness, the desired future condition for archaeological resources in the project area must be preservation.

Preservation of archaeological resources requires their removal from immediate use and protection from damage and deterioration. Management options for archaeological resources with a desired future condition of preservation are either: 1) redirection of all activity within archaeological site boundaries; 2) possible use of deterrents to bar entry to areas of archaeological resources; or 3) mitigation in the form of data recovery, enhanced inventories,

and site evaluations. These options will be addressed prior to the implementation of any site specific project.

Alternative 1

Direct Effects:

Cattle trampling associated with grazing and disturbance associated with recreation use will occur around lakeshores and in riparian and meadow areas. Because these areas have not yet been inventoried, the extent of effects to cultural resources is unknown. Other direct effects are common to all alternatives.

Indirect Effects:

This alternative contains several provisions likely to increase impacts to cultural sites. It will allow increased visitation and larger group sizes, thereby likely increasing impacts to cultural sites located along trails and in popular areas. Impacts to 14 known sites are expected to continue. Increases in recreational stock use that occur as general recreation use increases, may contribute to trampling of additional sites. Additional trail construction will give recreation users more access to new areas, resulting in the use of more areas which have not been surveyed and which may be sensitive. Again, due to lack of surveys, the magnitude of effects is unknown.

Several provisions may reduce localized impacts to cultural sites. Backcountry toilets, if installed away from sensitive areas and if properly maintained, may attract use that will otherwise result in disturbance to sites. Also, hardened campsites which are properly located over 100 feet from water may attract use away from sensitive areas. The overall effects of these projects is unknown, but is expected to be localized at specific lakes.

Use of campfires will result in more impacts associated with suppressing fires. Since many escaped campfires are located in popular camping areas at lakeshores, the effect on cultural sites may be substantial in localized areas. In general, prescribed natural fires in remote areas of the wilderness are expected to have minor impacts on cultural sites.

Cumulative Effects:

Impacts due to grazing will continue. If standards set for riparian and vegetation conditions result in the reduction of grazing, impacts to cultural sites will decrease accordingly. The extent of such effects is unknown.

Installation of backcountry toilets and demarcation of campsites may have a beneficial effect on cultural resources by drawing use away from sensitive areas; however, the effect will depend on the effective education and patrolling programs. Gains in local areas will be offset by increased impacts due to more use in broad areas of the wilderness.

Cumulative effects greater than those from any other alternative can be expected from increased use and an expanded trail system. The effects of increased use throughout the Desolation are likely to be substantial since current users are attracted to the same areas as were prehistoric and historic users. These effects may require closure of trails and/or campsites in culturally sensitive areas to mitigate the effects of increased visitation.

Alternative 2 (No Action)

Direct Effects:

There are 15 field-verified archeological sites which are known to be impacted by system trails, and 4 sites which are impacted by user-created trails. Impacts to these sites are attributed to trail use, since the trails either bisect the sites or are adjacent to them. These sites will continue to be impacted by trail use unless trails are moved. The complete nature and extent of impacts is unknown. Current grazing management will continue the associated impacts due to cattle movement in sensitive areas. Cattle trampling associated with grazing will occur around lakeshores and in riparian and meadow areas. Due to lack of inventories in most areas within wilderness allotments, the effects to cultural sites is unknown.

The use of lakeshore areas by permitted outfitter/guides is expected to continue impacts to those areas. The effects to cultural resources are unknown.

Other direct effects are common to all alternatives.

Indirect Effects:

Day use will continue to increase, increasing disturbance to popular areas and resulting in increased impacts to cultural sites. Identified impacts to known sites are expected to continue. Additional recreational stock use that will occur as general recreation use increases may contribute to damage to additional sites.

Fire suppression activities may result in effects to cultural sites. Suppression of all fires will result in more intense fires over time. The effects on cultural sites are expected to be more substantial as fire intensity increases. In general, this alternative is expected to result in the most impacts to sites from intense fires.

Cumulative Effects:

Impacts due to grazing will continue. The lack of standards for riparian and vegetation conditions provide less overall protection for areas where cultural sites are frequently located. The extent of such effects is unknown.

Cumulative effects in this alternative are expected to be similar to those in Alternative 1. Increases in recreation use, particularly day use, will increase impacts at accessible destinations within the Desolation.

Alternative 1

Direct Effects:

Due to decreases in use at popular areas, impacts to cultural sites are expected to decrease in such areas. The impacts in more remote areas will be similar to current conditions. Closing campsites located in sensitive areas may reduce impacts in those areas. The exact effect of campsite closures on cultural sites is unknown. In general, site impacts due to grazing are expected to decrease slightly due to riparian standards. They will decrease substantially in the high use areas of allotments where cattle are not grazed. Cattle trampling will; however, occur around lakeshores and in riparian and meadow areas where cattle are grazed. Due to lack of inventories in most areas within wilderness allotments, the magnitude of effects to cultural sites are unknown.

The use of lakeshore areas by permitted outfitter/guides is expected to continue impacts to those areas. Due to lack of inventories, the magnitude of effects is unknown.

Impacts due to guided use will be similar to those under the No Action Alternative, with the exception that a slight decrease in use in OC 1 and 2 areas is expected to provide a slight reduction in impacts to campsites used in those areas.

The 200 foot sanitation setback may provide protection for sites located close to water. Due to lack of inventory, the exact effect to sites is unknown. The Forest Order to bury or pack out toilet paper in cat-holes formalizes practices already promoted in national Forest Service educational materials. Burying toilet paper will cause ground disturbance. Due to lack of cultural resource inventories, the magnitude of effects is unknown.

Other direct effects are common to all alternatives.

Indirect Effects:

Day use will decrease in popular areas and should result in reduced impacts to cultural sites. Limits on recreational stock numbers may help limit damage to additional sites.

Fire suppression activities in popular areas may result in effects to cultural sites from fireline construction. However, the use of minimum impact suppression tactics designed for use in wilderness are expected to minimize such effects. In general, the effects of prescribed fires on sites are expected to be less than the effects of wildfires. This alternative is expected to result in less impacts to sites from intense fires than either Alternatives 1 or 2.

New trails in areas outside the Desolation may expose new sites to increased impacts due to recreation use. The potential to effect sites will depend on trail locations and are unknown at this time.

Cumulative Effects:

Impacts due to grazing will continue, but are expected to be somewhat less than in either Alternatives 1 or 2. The extent of such effects is unknown.

Cumulative effects of this alternative are expected to be somewhat less overall than those in Alternative 2. Decreases in recreation use in popular areas are expected to decrease impacts at accessible destinations within the Desolation. Cumulative effects in remote areas of the wilderness are expected to be slightly less than in Alternative 2 due to standards which will provide a mechanism for limiting impacts in specific areas. The magnitude of such effects is unknown.

Alternative 4

Direct Effects:

The direct effects to cultural sites in this alternative due to grazing will be the same as in Alternative 1. The extent of such effects is unknown.

The 200 foot sanitation setback may provide protection for sites located close to water. Due to lack of inventory, the exact effect to sites is unknown. The Forest Order to bury or pack out toilet paper in cat-holes formalizes practices already promoted in national Forest Service educational materials. Burying toilet paper will cause ground disturbance. Due to lack of cultural resource inventories, the magnitude of effects is unknown.

Impacts due to guided use will be less than those under Alternatives 1 through 3 due to reductions in the number of service days available for guiding.

Indirect Effects:

Day and overnight use will decrease in popular areas and should result in reduced impacts to cultural sites. Reduced group size limits for recreation users and recreational stock should further reduce the ongoing impacts to both identified and unidentified sites. The extent of these reductions is unknown.

Fire suppression activities in popular areas are expected to continue due to illegal campfires, however such activities will be fewer in number than in Alternatives 1 through 3. In general, the effects of prescribed fires on sites are expected to be less than the effects of wildfires. Implementation of this alternative is expected to result in less impacts to sites from intense fires than in Alternatives 1 through 3, however the magnitude of effects to cultural sites is unknown.

New trails in areas outside the Desolation may expose new sites to increased impacts due to recreation use. The effects to such sites will depend on trail locations and are unknown at this time.

Cumulative Effects:

Impacts due to grazing will be the same as in Alternative 1. The extent of such effects is unknown.

Cumulative effects of this alternative are expected to be somewhat less overall than those in Alternative 3. Further decreases in recreation use and group sizes, along with further closures of sensitive campsites, are expected to decrease impacts due to recreation use. The magnitude of such effects is unknown.

The cumulative effects to trailed areas outside of the Desolation may be more pronounced in this alternative than in Alternatives 1 through 3. However, such effects will depend on trail location and are unknown at this time.

Alternative 5

Direct Effects:

The direct effects to cultural sites in this alternative due to grazing will be the same as in Alternative 1. Due to lack of inventories in most areas within wilderness allotments, the magnitude of effects to cultural sites are unknown.

The 200 foot sanitation setback may provide protection for sites located close to water. Due to lack of inventory, the exact effect to sites is unknown. The Forest Order to bury or pack out toilet paper in cat-holes formalizes practices already promoted in national Forest Service educational materials. Burying toilet paper will cause ground disturbance. Due to lack of cultural resource inventories, the magnitude of effects is unknown.

Indirect Effects:

Day and overnight use will further decrease within the Desolation and should result in further reduced impacts to cultural sites. Further reductions in group size limits for recreation users and recreational stock should further reduce the ongoing impacts to both identified and unidentified sites. The extent of these reductions is unknown.

The effects due to fire management activities within the Desolation, and construction of non-wilderness trails will be similar to those in Alternative 4.

Cumulative Effects:

Impacts due to grazing will be the same as in Alternative 1. The extent of such effects is unknown.

Cumulative effects to cultural sites are expected to be somewhat less overall than those in Alternative 4 due to further decreases in recreation use and group sizes, along with further closures of sensitive campsites. The magnitude of such effects is unknown.

The cumulative effects to trailed areas outside of the Desolation may be more pronounced in this alternative than in Alternatives 1 through 4. However, such effects will depend on trail location and are unknown at this time.

Alternative 6

Direct Effects:

The direct effects to cultural sites in this alternative due to grazing are expected to be similar to those in Alternative 1. Lower recreation use will result in fewer direct effects due to camping and hiking. The Forest Order to pack out human waste and toilet paper will reduce ground disturbance associated with cat-holes.

Indirect Effects:

Compared to Alternative 5, day and overnight use will further decrease within the Desolation and should result in further reduced impacts to cultural sites. Further reductions in group size limits for recreation users and recreational stock should further reduce the ongoing impacts to both identified and unidentified sites. The extent of these reductions is unknown.

The effects due to fire management activities within the Desolation, and construction of non-wilderness trails will be similar to those in Alternative 4.

Cumulative Effects:

Impacts due to grazing within the wilderness will be the same as those in Alternative 1.

Cumulative effects to cultural sites are expected to be lowest in this alternative due to low numbers of recreation use, small group sizes, and further closures of sensitive campsites. The magnitude of such effects is unknown.

The cumulative effects to trailed areas outside of the Desolation may be the most pronounced in this alternative. However, such effects will depend on trail location and are unknown at this time.

Table 4-2

SITE DISTURBANCE, INTEGRITY, AND ELIGIBILITY FOR THE NATIONAL REGISTER OF HISTORIC PLACES

Site #	PS	OT	UT	OC	FP	C/CA	R	PD	SW	G	C	P/H	I	NR
55-270	X	X	X	X		X	X					P	1	?
55-271		X	X			X		X				H	4	N
55-272		X			X	X	X	X				H	4	N
55-273		X			X	X		?				H	3/4	?
55-274	X				X	X	X					P	1	?
55-275		X			X	X	X					P/H	1	?
55-276	X	X			X	X						P/H	2/3	?
55-277	X											P	2/3	?
55-278		X		?	?	?		X				H	4	N
55-17					X	?						H	1	E
55-303			X			X			X	X		P	1	?
55-304						X						P	1	?
55-336							X		X		X	P	1	?
55-430		X				?	X		X			P	1	?
55-431		X				?	X		X			P	1	?
55-432		X				?	X		X			P	1	?
55-474		X					X				X	P	2	?
55-475					X	X						P	1	?
55-488		X		X	X							H	3	N
55-489		X	X			X	X		X			P/H	3/4	?
55-490		X				?	?	?	X	?		H	1/2	?
55-491		X				?	X			X		H	3/4	
55-535					X	X						P	2/3	?
55-536					X	X						P	2/3	?
55-537												P	2	?
55-538														?

Note: Condition of remaining 52 sites documented from literature reviews is not presently known.

KEY

PS = Partially Submerged
OT = Official Trail
UT = Unofficial Trail
OC = Other Construction
FP = Fire Pits/Rings
C/CA = Camping/Cleared Areas
R = Rodent Burrows
PD = Partially Dismantled

SW = Sheet Wash
G = Grazing
C = Cryoturbation
P/H = Prehistoric/Historic
I = Integrity
1=Excellent
2=Good
3=Fair
4=Poor

NR = Eligibility for the NRHP
E=Eligible
N=Not Eligible

2. RANGE

This section addresses the effects of wilderness management alternatives on range resources. The analysis of effects is focused on permittee operations and the forage resource for Desolation Wilderness only. Other sections including fisheries, hydrology, recreation, and cultural resources describe impacts of grazing on these resources and activities. Measures used to estimate effects are (1) indicators described in Chapter 2 of the DEIS and (2) anticipated conflicts with recreation users. For all alternatives, if indicators described in Chapter 2 are not met, it is determined that resource impacts will be addressed through changes to the grazing permit. Indicators that apply to grazing are ecological condition, trend, soil disturbance, utilization, and utilization of woody riparian species.

Range direction specific to the wilderness will be considered for future Allotment Management Plan updates. Specific effects will be determined through site-specific analysis.

Effects Common to All Action Alternatives

Direct and Indirect Effects

Grazing is only likely to continue at current levels in Alternative 2. In other alternatives, allotments within Desolation Wilderness may or will require a reduction of animal unit months (AUMs) or livestock numbers equivalents due to implementation of Indicator Standards. If this occurs, any modification to the grazing permit not agreed to by the permittee may be made only after the permittee has received written notification at least 1 full year in advance of the modification becoming effective (FSH 2209.13 section 16.13).

Cumulative Effects

The only reasonably foreseeable future project that is expected to contribute effects to these grazing allotments is the forest-wide land and resource management plan grazing amendment currently being completed for the Eldorado and Tahoe National Forests. As stated in Chapter 2, if the forest-wide standards are different than those described in this document, the forest-wide standards will be implemented. For Desolation Wilderness, unless the forest-wide standards are widely different than described in this document, cumulative effects are not expected to be any greater than the effects described above.

Alternative 1

Direct and Indirect Effects

Indicators

1. Ecological Condition

Since Wrights Lake Allotment has been determined to be in good ecological condition, effects to permittee operations are expected to be minimal on this allotment.

The current ecological conditions are not known and cannot be estimated for Tells Peak, Pyramid and Pearl Lake Allotments. If future monitoring indicates the "desired condition" standard is met, effects to permittee operations are expected to be minimal. If the condition is determined to be "between" or "unhealthy" for Tells Peak, Pyramid, or Pearl Lake Allotments, possible measures that could be taken to improve condition would be resting, changing season of use, changing salt locations, additional herding, and changes in livestock numbers. Specific measures would be selected based on information developed through monitoring. The worst case scenario for any of these allotments would be that they would be in a downward trend and would be rested. The estimated cost to permittees if all 3 allotments were rested would be approximately $7,100 to $17,000 for replacement forage per year of rest. Additional costs for herding to keep livestock within the non-wilderness portion of the allotments is estimated to be $5,000 to $8,000 per year of rest. Although ecological conditions are not known, based on past field reviews, it is expected that the effects would be less dramatic than described in the worst case scenario.

2. Trend

Trend within the wilderness portion of the Wrights Lake Allotment is estimated to be stable to upward due to the improved range conditions experienced between 1962 and 1992; therefore, minimal effects to permittee operations would be expected.

The trend for Tells Peak, Pearl Lake and Pyramid Allotments is not known and cannot be estimated. If the trend is determined to be stable or upward, the effect to permittees is expected to be minimal. If the trend is determined to be downward, measures that could be taken to improve trend could include resting, changing season of use, changing salt locations, additional herding, and changes in livestock numbers. Specific measures would be selected based on information developed through monitoring. The worst case scenario for any of these allotments would be that they would be in a downward trend and would be rested. The estimated cost to permittees would be approximately $7,100 to $17,000 for replacement forage per year of rest. Additional costs for herding to keep livestock within the non-wilderness portion of the allotments is estimated to be $5,000 to $8,000 per year of rest.

3.Soil Disturbance

Because it is estimated that the soils occurring on suitable range are predominantly fine-textured, the potential for compaction is a concern. The current level of soil disturbance is not known and

cannot be estimated for allotments in the wilderness. If, after monitoring, soil disturbance is found to be greater than moderate, possible measures that could be taken to reduce soil disturbance would be resting, changing season of use, changing salt locations, additional herding, and changes in livestock numbers. Specific measures would be selected based on information developed through monitoring.

Current trampling and chiseling levels are not known for the 4 allotments and can not be estimated. If it is determined that trampling and chiseling from grazing are contributing to lake shore and stream channel degradation in excess of 20 percent, measures that could be taken to reduce degradation would be resting, changing season of use, changing salt locations, additional herding, and changes in livestock numbers. Specific measures would be selected based on information developed through monitoring.

If soil disturbance and/or trampling and chiseling standards are exceeded for any allotment, the worst case scenario would be that the allotment would be rested. If all allotments were rested, the estimated cost to permittees would be approximately $7,100 to $17,000 for replacement forage per year of rest. Additional costs for herding to keep livestock within the non-wilderness portion of the allotment is estimated to be $5,000 to $8,000 per year of rest. Although soil disturbance and lake shore and stream channel conditions are not known, based on past field reviews, it is expected that the effects would be less dramatic than described in the worst case scenario.

4. Utilization

If utilization standards are determined to be exceeded, effects to the permittee operations are expected to be minimal, since utilization is the removal of the current year's forage production. This means that if the standards were exceeded, the permittee would be required to remove livestock or herd them out of the area for the remainder of the year only. These utilization measures are expected to result in minimal effects to permittee operations since utilization is based on annual production, and any measure would be taken for the remainder of the year only. If monitoring indicates that measures to meet the standard need to be implemented on a recurring basis, specific measures to correct the long-term problem would be selected based on the monitoring information.

5. Utilization of Woody Riparian Species

If utilization of woody riparian species is determined to be greater than 20 percent of the current annual growth, measures to be taken would be changing season of use, additional herding, or adjusting livestock numbers. These utilization measures are expected to result in minimal effects to permittee operations since utilization is based on annual production, and any measure would be taken to the remainder of the year only. If monitoring indicates that measures to meet the standard are required on a recurring basis, specific measures to correct the long-term problem would be selected based on the monitoring information.

Conflicts with Recreation Users

This alternative would increase wilderness recreation use by adding more trail and increasing quotas. It is expected that more conflicts would occur between recreation and livestock in active allotments during seasons of use. Since livestock and recreation users tend to concentrate in the same lake and riparian areas, especially during the hot part of the day, conflicts will be focused in these areas. When livestock come in to contact with people and dogs, livestock tend to either disperse or become herded. Dispersed livestock may move into undesirable areas such as campsites or riparian areas; herded livestock may become concentrated and are herded along trails. This would result in increased conflicts with recreation users. In addition, livestock grazing patterns and distribution would change due to increased trails and recreation use and has the potential to increase grazing in some areas and decrease grazing in other areas. Additional herding would be required by permittees to reduce concentrations of livestock in undesirable areas. The estimated costs to permittees would be $2,000 per year for additional herding. If an allotment is rested, conflicts between livestock and recreation in the area being rested would be expected to decrease.

Cumulative Effects

See effects common to all.

Alternative 2

Direct and Indirect Effects

Indicators

Current LRMP standards would remain in effect. Grazing would continue at current levels. No changes or additional costs to permittee operations are expected.

Conflicts with Recreation Use

Livestock and recreation conflicts would continue in popular lake basins and riparian areas. No additional costs to permittee operations are expected.

Cumulative Effects

See effects common to all alternatives.

Alternative 3

Direct and Indirect Effects

Indicators

The effects would be the same as described in Alternative 1.

Conflicts with Recreation Use

Alternative 3 calls for the elimination of herding livestock into Maude, Gertrude, Tyler, Grouse, Lyons, Twin and Sylvia lake basins to reduce recreation and livestock conflicts. Because cattle have to be herded into Maude, Tyler and Gertrude Lakes, recreation and range conflicts in these areas would be eliminated. These areas would also be eliminated as available forage areas, which would be expected to reduce permitted livestock on the Wrights Lake Allotment by approximately 92 AUMs. The estimated cost to permittee operations would range from $2,000 to $5,000 for replacement forage. Although livestock would not be herded, they would continue to drift into Lake Sylvia, Lyons, Twin, and Grouse Lake areas of the Wrights Lake Allotment. Recreation and livestock conflicts are expected to continue in these areas. No additional costs to permittee operations are expected.

Recreation and livestock conflicts are expected to continue in the following lake basins of the Pearl Lake Allotment if the allotment is filled in the future: Top, Lost, Lake No. 3 and No. 5. Livestock would not be herded into Lawrence Lake basin if the Pearl Lake Allotment is filled, reducing the potential for recreation and livestock conflict in that area.

The elimination of cowbells within wilderness portions of allotments is expected to affect both wilderness and non-wilderness portions since cattle move freely across the wilderness boundary. In addition, because livestock are "belled" prior to moving onto the Forest, elimination of cowbells is expected to affect herding and gathering management practices on the Big Hill Allotment. The elimination of cowbells is expected to increase the cost to permittee operations due to additional herding by $1,500 to $2,000 per year. Cowbells assist and expedite permittees in livestock herding and gathering activities because bells help permittees locate livestock. Without cowbells, livestock herding and gathering management practices may not be as effective. Livestock may concentrate in riparian areas or campsites longer if they cannot be located for herding. The elimination of cowbells is expected to reduce recreation and livestock conflict by the elimination of cowbell noise, however, livestock may remain in campsites longer.

If additional trails are developed outside the wilderness, additional livestock and recreation conflicts are expected if trails are built near suitable range, near livestock watering locations, or popular recreational areas. It is estimated that additional herding would be required. Estimated cost to permittee operations is $100 to $500 per year.

Upon the completion of a site-specific environmental analysis for the Rockbound Allotment, if a new term grazing permit is issued, it is expected that livestock and recreation conflicts would occur due to livestock drifting into high use recreation areas. It is expected that a permittee

would be required to actively herd livestock on a daily basis, which would result in increased permittee operation costs over the costs that were historically required to operate the allotment.

Cumulative Effects

See effects common to all alternatives.

Alternatives 4 and 5

Direct and Indirect Effects

Indicators

See Alternative 1.

Conflicts with Recreation Use

Alternatives 4 and 5 would decrease wilderness recreation use by decreasing group size and visitor use. In these alternatives the potential for recreation and livestock conflicts would be reduced accordingly. It is estimated that the effect to permittee operations would not be significantly different than the current situation. It is expected that less conflicts would occur between recreation and livestock in active allotments during seasons of use. Conflicts are expected to continue in lake basins and riparian areas, but to a lesser degree than in Alternatives 1, 2 and 3.

Alternatives 4 and 5 call for the elimination of herding livestock into Maude, Gertrude, Grouse lake basins during below average precipitation years to reduce recreation and livestock conflicts. Because cattle have to be herded into Maude and Gertrude Lakes, recreation and range conflicts in these areas would be eliminated. These areas would also be eliminated as available forage areas in low precipitation years, which would be expected to reduce permitted livestock on the Wrights Lake Allotment by approximately 92 AUMs. The estimated cost to permittee operations would range from $2,000 to $5,000 for replacement forage.

Recreation and livestock conflicts are expected to continue in the following lake basins of the Pearl Lake Allotment if the allotment is filled: Top, Lost, Lake No. 3 and Lake No. 5. Livestock would not be herded into Lawrence Lake basin if the Pearl Lake Allotment is filled, reducing the potential for recreation and livestock conflict in that area. The estimated effects to permittee operations would be minimal since this allotment is currently vacant. Upon the completion of a site-specific analysis for the Pearl Lake, if a new permit term grazing permit is issued, it is expected that this allocation of the forage base would not be available for grazing.

It is expected that by closing the Rockbound Allotment any livestock and recreation conflicts there would be eliminated. It is estimated that there would be no direct effects to a permittee since there is currently no grazing permit for this allotment.

Cumulative Effects

See effects common to all alternatives. In addition, closing the Rockbound Allotment would reduce the Forest's overall forage availability and output by approximately 220 AUMs.

Alternative 6

Direct and Indirect Effects

Indicators

Expected effects are estimated to be the same as the worse case scenario described in Alternative 1. In some cases, resting areas of the allotment may result in other areas to be rested due to the location and relationship to suitable grazing areas.

Conflicts with Recreation Use

The effects would be the same as described in Alternatives 4 and 5.

Cumulative Effects

See effects common to all alternatives. In addition, closing the Rockbound Allotment would reduce the Forest's overall forage availability and output by approximately 220 AUMs.

3. RECREATION

All wilderness management activities, especially the management of recreation, have the potential to affect the recreation experience of the Desolation visitor. The extent of impact to recreation users differs among the alternatives due to the various levels of management controls assigned to each alternative.

Effects Common to All Alternatives:

Direct:

Recreation use will continue to be concentrated along travel routes and within lake basins of the Desolation. Those areas close to trailheads will continue to receive more use than remote areas.

All alternatives continue implementation of the visitor permit system for both overnight and day use of the Desolation. The permit requirement facilitates distribution of information on wilderness regulations and Leave No Trace ethics which are designed to help protect the physical and social resources of the Desolation. In addition, permits provide accurate information on recreation use within the Desolation.

Although the length of the quota season varies by alternative, all alternatives continue the summer quota on overnight use. The method of quota administration and allowable use capacities vary by alternative and will have differing effects on recreational use. In all alternatives, there will be minimal impact to winter recreation use as quotas are not implemented during the winter months. To enter the Desolation Wilderness, winter users must still obtain a wilderness permit at a Forest Service office.

In every alternative, fees for overnight use, day use and reservations may be charged as part of the Desolation Wilderness fee pilot program.

All alternatives restrict the number of permitted outfitter/guides. Recreation use occurring under commercial permit is expected to result in fewer impacts to the wilderness resource than a comparable amount of use by the general public due to the education and guidance available from the outfitter/guides. However, day use by camps and guides is expected to result in larger group sizes than is the norm for the general public.

In some years, either wildfires or prescribed fires may impact recreation users in a variety of ways, including: occasional displacement from some destinations during active fires, visual scars from fires, respiratory distress due to smoke, and temporary reductions in visibility.

Stock use will continue in the wilderness, subject to specific restrictions which vary by alternative. Recreation users will continue to have opportunities to hunt and fish under all alternatives. The ability to carry firearms is not affected by any alternative.

Rock-climbers will be affected by variations in the alternatives only to the extent that they are affected as either day users or campers. A moratorium on the placement of bolts within the Desolation will be in effect until superseded by national policy currently being developed. The effect of this moratorium is expected to be minor since the number of climbers using areas within the Desolation is small.

Indirect:

Campsites and popular trailed areas will offer less solitude than more remote and cross-country areas. Campsites will be evident in popular areas. In addition, campsites which are no longer used will continue to be evident until restored.

Reservation and/or use fees will reduce slightly the number of unclaimed reservations, but may preclude some recreation users from using the Desolation. The effect of fees on the amount of recreation use is expected to be minimal. The return of monies generated to provide for management needs of the Desolation will enhance social and resource conditions for wilderness users.

Cumulative:

Use on non-peak days and in less popular areas of the wilderness will continue to increase at a slow rate as more days are filled to capacity in popular areas. This rate will vary depending on the quota limits specified in each alternative.

Winter use will continue to increase over time. Use will continue to be concentrated on weekends, and in areas which are easily accessed from plowed roads.

Use of new campsites will continue to increase the number of campsite impacts to some extent, depending on the alternative chosen. Campsites which currently exist will take many years to recover naturally. The process of restoring inappropriate campsites will also take a long time. Occasional use of closed sites will extend the time needed for their recovery. At the same time, new sites will be created by small amounts of use in new locations. This effect will be most pronounced in Alternative 1 and least pronounced in Alternative 6.

Eventually, visitors may see less evidence of cattle within the Desolation, depending on the results of analysis considering the costs and benefits of grazing versus the recreational values of specific areas within allotments. Any effects will be dependent on future analysis.

Effects Common to All Action Alternatives:

Direct:

Establishing Indicators and Standards for social and resource conditions in the action alternatives will provide a framework for assessing both wilderness recreation conditions, and the effectiveness of actions which are taken to protect conditions.

All action alternatives restrict the number of allocated service days for outfitter/guides. Allocated use for outfitter/guides will be based on recent levels of guided use, relative to the general recreational use allowed in each alternative.

All action alternatives provide for the implementation of a Prescribed Natural Fire program within the Desolation, with some variations by alternative. Visitors may be inconvenienced by prescribed fires as listed in the "Effects Common to All Alternatives" section above. Visitors will also experience fire as a natural ecosystem process.

Indirect and Cumulative:

Indicators and standards will result in reduced recreation impacts in high use areas and in maintenance of desired conditions in all areas. To the extent that recreation standards are exceeded, additional management actions to bring social and resource conditions back within the standards will affect recreation users.

Alternative 1

Direct:

This alternative provides the least restrictive overnight quota of all alternatives. Although the current quota does not limit use for the wilderness as a whole, use on peak days is limited at the popular trailheads. This alternative will allow increased overnight use at those popular trailheads on peak days. Recreation use at all trailheads is expected to increase. Day use will not be limited and will continue to increase. Overnight use will continue to increase in lesser used areas as more popular trailheads are filled to capacity. Overnight and day use may exceed 1700 persons on a typical high use day.

A maximum group size of 25 persons will accommodate more use by large family and organization groups. This group size limit will far exceed the average group size in the Desolation.

To accommodate the increased use, less primitive conditions than currently exist will be tolerated in 16 management zones. Visitors will be encouraged to disperse into lesser used areas, increasing contacts between parties in such areas. New campsites form with minimal use and established campsites return to natural conditions very slowly (Cole 1982). Therefore, recreation users will see increasing evidence of campsites as new campsites are created in areas where there is currently little use.

People who enjoy campfires as part of their wilderness experience will again be allowed to have campfires.

Because of the increase in recreation use and new trails to be constructed as part of this alternative, it is expected that more conflicts would occur between recreation and livestock in active allotments during seasons of use. Since livestock and people tend to concentrate in the same lake and riparian areas, especially during the hot part of the day, conflicts will be focused in these areas. If measures taken to meet indicator standards result in less presence of cattle, as would occur with changing season of use, reducing numbers of animals, or resting portions of allotments, conflicts between recreation use and livestock would be expected to decrease.

Campers may encounter natural fires in remote areas of the wilderness. In some years, they may be displaced from more remote destinations due to natural fires.

Camping setbacks at some lakes will give campers a greater sense of solitude as fewer camps will be visible along the lake shore. In general, this would also help protect sensitive sites near lakes. Mandatory setbacks could, however, eliminate some otherwise suitable campsites closer to lakes (those on decomposed granite) and force people into potentially less desirable areas (those with grass and vegetation) further out. At lakes where there are backcountry toilets, camping use may be concentrated near the location of the toilets, however, the effects of toilet installation on use is unknown and is dependent in part on adequate maintenance of the toilets. Maintenance levels may be affected by staffing during low use periods of the year, weather and snow conditions, and budget levels.

Day hikers and campers with dogs will be asked to keep pets under voice control as is currently the case. Users will continue to experience noise from low flying aircraft.

There will be no special limits to recreational stock use within the Desolation.

The number of outfitter/guides will be limited, but guided use will increase over that which is currently allowed. Visitors seeking guided winter trips and guided day hikes will be able to obtain them. Those users who are unable to hike into the wilderness due to physical limitations will be able to enter by horseback. Camp participants at Camp Sacramento, Berkeley Echo Camp Camp Concord and Stanford Camp will be able to participate in trips guided by camp staff..

This alternative will result in approximately 15 miles of additional trails, providing improved access for day users and backpackers. The major trail routes will be managed for high use . Due to increased use quotas and group sizes, some trails will need trail hardening with crushed aggregate and other higher standards structures such as rock riser stairways and barriers. Traffic problems at Wrights Lake will be mitigated through improvements at the Twin Lakes trailhead. Analysis will continue on ways to improve sanitation and public safety at the Twin Bridges trailhead. Trail signing within the wilderness will increase.

Indirect:

Encounters among visitors will increase in all areas of the wilderness as use increases. In addition, encounters with large groups will increase as more large groups take advantage of the 25 person group size limit. Current outfitter/guide group size data available for the Desolation, indicates that group sizes are larger for guided trips. The increased guided use is therefore also expected to increase use by large groups. Research on visitor trends and attitudes indicates that visitors to the Desolation prefer to encounter a group size of no more than 10 persons (Watson and Daigle 1991). Guided day hikes in popular areas are expected to increase visitors' encounters with large groups. More visitors will find social conditions exceeding their expectations.

Both the inclusion of guided use within the quota limits and an increase in the amount of outfitter guides will result in a corresponding decrease in the number of overnight spaces available to the general public during the quota season.

Overnight visitors will see more evidence of others in remote areas. The increase in use in such areas will result in more displacement of wilderness users who seek solitude. Research by Watson and Daigle (1991) indicates that 19 percent of day users and 38 percent of Desolation's campers feel that they see too many people in the Desolation. Such users are expected to be displaced to lesser used areas of the surrounding Forests or nearby Wilderness areas, increasing use in those areas.

The perceived naturalness of the wilderness will be impacted by the presence of campfire rings, ashes, and charcoal at campsites.

As the number of users increases, the number of recreational shooters, stock users, and dogs is expected to increase proportionately. Conflicts between user groups is expected to increase.

Additions to trails will increase access to new areas of the wilderness. The construction of loop trails is expected to lower encounters between groups in popular areas, but the extent to which this will occur is unknown. Many trail widths will exceed management objectives due to increased volumes of use. Increased signing within the wilderness will provide for less reliance on primitive skills such as route finding and map and compass reading.

Cumulative:

Over time, the incremental buildup in fuels will contribute to more intense and extensive wildfires in popular visitor zones. This will displace visitors during the actual fires and impact the scenic attractiveness of the area.

Localized depletion of firewood will occur in campsite areas. The effect of this will be most pronounced in Opportunity Class 3 and 4 areas where there are high numbers of campsites. Visitors will have to travel farther from their campsite to obtain firewood. As has happened in the past, some visitors will break dead and live branches from trees rather than search farther for wood. This will substantially impact the naturalness of campsite areas over time.

Increases in use will continue to impact the availability of solitude, and perceptions of crowding. The physical impacts of this use will be increasingly noticeable to wilderness users.

In the 1978 Wilderness Plan, the trail system was reduced to provide a more remote wilderness experience. This alternative reopens some of the trails that were dropped from the system in the 1978 plan, providing less primitive conditions and greater access. Over time, less primitive conditions within the Desolation are expected to lead to a shift in users towards those who have less backcountry skills and knowledge. As the proportion of less skilled users increases, impacts are expected to increase due to lower use of Leave No Trace skills.

Alternative 2 (No Action)

Direct:

This alternative will continue the existing management of the Desolation. This alternative does not provide standards for measuring changes to resource and social conditions within the wilderness. In addition, the alternative continues the differing direction for recreation management found in the Lake Tahoe Basin Management Unit and the Eldorado National Forest LRMPs.

Recreation use is expected to increase due to increasing day use. Overnight use will increase on lesser used trails and on weekdays as popular trailheads are filled to capacity on more days. Total use of the Desolation is expected to exceed 1400 persons on a typical high use day.

The group size limit will continue at 15 for all areas of the wilderness. The impact of this group size limit to Desolation visitors is insignificant since under 2 percent of the visitors to the Desolation are in groups of over 10 people.

The quota will continue to be administered by trailhead, with campers free to choose their destination once in the wilderness. A wilderness permit will continue to be required year round for both day use and overnight use.

The closure on wood fires will continue.

Visitors to areas within active range allotments will continue to see and hear cattle. Livestock and recreation conflicts would continue in popular lake basins and riparian areas.

All natural fires and wildfires will be suppressed. In some years, large stand replacing wildfires may occur due to fuels build up and weather conditions. During these years, visitors will be displaced from the areas where active wildfires are occurring within the wilderness.

Wilderness education messages will encourage campers to camp away from visible and sensitive lake shore areas; however, it is expected that use will continue to concentrate at sites within 25 feet of the lake shores. No special sanitation measures will be implemented, but educational messages will emphasize proper sanitation practices.

There will be no special regulations affecting dog owners; they will be asked to keep dogs under voice control. Wilderness direction will continue to differ from the El Dorado County Ordinance requiring that dogs be on leashes.

Users will continue to experience daily noise intrusions from aircraft flying below the 2,000 foot FAA flight advisory.

There will be no limits pertaining specifically to recreational stock use within the Desolation.

This alternative will continue current discrepancies between the Eldorado National Forest and Lake Tahoe Basin Management Unit LRMPs regarding outfitter/guide permits within the wilderness. Outfitter/guides currently operating within the Desolation will continue to do so, with no limit on the amount of guiding that they may conduct within the Desolation. Guided overnight use will not be limited by the trailhead quotas and may result in use in excess of the trailhead quotas in some areas. The permits for Camp Sacramento, Berkeley Echo Camp and Camp Concord will not be updated, nor a new permit issued to Stanford Camp to provide for guided use within the Desolation. Camp participants could still obtain their own permits to hike, without a guide, as quotas allow. Those users who are unable to hike into the wilderness due to physical limitations will be able to enter by horseback.

The current trails will continue to be maintained to Forest standards. Traffic problems at Wrights Lake will be mitigated through improvements at the Twin Lakes trailhead. Analysis will continue on ways to improve sanitation and public safety at the Twin Bridges trailhead. The current signing at trailheads and within the wilderness will continue.

Indirect:

Encounters among visitors will continue to increase in all areas of the wilderness. Such increases will be most pronounced in popular day use areas, particularly at Eagle Lake. Encounters in remote areas will increase at a slow rate since most campers travel only limited distances to campsites and day users do not typically reach the remote areas.

Fewer groups will be able to find their desired campsites. Twenty-six percent of those campers sampled by Watson and Daigle (1991) indicated that they can find a preferred campsite less than half the time. As use increases, this percentage is expected to increase. Trailhead quotas will not prevent overcrowding at individual lakes when the majority of campers using a trailhead decide on the same destination. As use increases, visitors will also disperse into lesser used areas, increasing campsite and trail impacts in those areas. The increase in use in such areas will result in more displacement of wilderness users who seek solitude.

Visitors will continue to camp in close proximity to the lake shores, visually impacting sensitive areas, and increasing perceptions of crowding at lakes.

The closure on campfires will continue to improve visual and resource conditions at lake shores and in other areas where fire rings were formerly established.

As the number of users increases, the number of recreational shooters, stock users, and dogs is expected to increase proportionately. Conflicts between users groups is expected to increase.

Guided overnight use within the Desolation will cause overnight use to exceed trailhead quotas when the guided use occurs on peak days in popular areas.

Major trails will stay in their current condition or have a moderate improvement under current maintenance schedules. The secondary, or lower standard, trails will continue to degrade and cause other resource problems.

Cumulative:

Because no standards will be implemented to protect desired conditions, this alternative provides the least protection of wilderness recreation conditions into the future.

Over time, incremental build up in fuels will contribute to more intense and extensive wildfires within the wilderness. Visitors planning to visit areas of the wilderness in which an active fire is burning will be displaced by the fire activity. In addition, wilderness users will experience poor visibility during major wildfires. Visitation to areas experiencing intense wildfires will likely be displaced for several years after the fire.

Increases in use will continue to negatively impact the availability of solitude and perceptions of crowding. The physical and social impacts of this use will be increasingly noticeable to wilderness users. Major trails will be aggressively maintained; however other trails will continue to deteriorate, causing erosion and related resource problems.

Alternative 3

Direct:

This alternative implements social and resource standards which are designed to return several areas of the Desolation to more primitive conditions than currently exist, and to protect current social conditions in the rest of the Desolation. Management actions will be implemented to reduce use and impacts in the 6 management zones which currently do not meet wilderness standards. In addition, 25 zones will be managed to provide primitive conditions and to restore impacts from long term use.

To maintain the desired social and resource standards for each zone, the overnight quota for the wilderness will initially be reduced from 700 to 582 persons per day. The quota of 582 is higher than current use, even on the highest use days in 1993. The quota will be administered by lake in OC 3 and 4 areas, and by zone in OC 1 and 2 areas. Use at popular lakes will generally decrease and use at lesser used lakes is expected to increase somewhat, in effect dispersing use within the more heavily used zones. In general, those wishing to camp in the Desolation will be

accommodated. However, some people may not obtain their first choice of destinations on peak days in popular areas. Campers will be unable to camp at the 6 lakes designated for day use only, and will need to select alternate destinations.

Day use quotas will be established for OC 4 areas, and for other areas as needed to maintain social and resource standards. Visitors successful in obtaining a permit for these areas, and for the 6 day use lakes, will have fewer encounters with others during their visit and will experience more natural conditions. The quota limits for several trails are set at approximate current average use levels, hence will not likely limit use on average days, but will limit use on peak days. The expected effect of the quotas will be to reduce current average use slightly in such areas. The day use quota for Eagle Lake is substantially less than the average day use of the area, therefore, a substantial number of recreation users will find their access to the area limited on most days during the summer season. Those hikers who receive permits for Eagle Lake, however, will find less crowded conditions.

Total use is expected to drop from current numbers. However, the total number of persons using the wilderness on a typical high use day will depend on the number of day users who will pick alternate wilderness trails when popular trails are full.

The quotas will be adjusted as necessary to maintain standards set for social and resource conditions. The time period that the quota is in effect will be extended to include the period from May 1 through September 30.

Reductions in group size limits will have limited impacts on recreation users since 99 percent of groups within the Desolation have 10 members or less and 94 percent of the groups have under 6 members. Groups of more than 6 persons will have limited access through the wilderness.

Undesirable campsites, those which are highly visible or located in sensitive areas, will be "closed" or naturalized. Campers will be encouraged to use established campsites. Research by Watson and Daigle indicated that approximately 90 percent of the surveyed campers preferred seeing under three other parties camped within sight or sound of their campsite. This alternative will protect such conditions in all but OC 4 areas.

Campfires will generally be prohibited to maintain natural conditions, but will be allowed in designated areas within OC 1 and 2 which have sufficient firewood available. This will enhance the recreation experience of those visitors who desire campfires.

Because cattle would not be herded into Maude, Gertrude and Tyler lake Basins and would not be expected to drift there, recreation and livestock conflicts would be eliminated in those areas. Although cattle would not be herded into Lake Sylvia, Lyons, Twin and Grouse Lake areas, some recreation and livestock conflict would be expected to continue if cattle drift into these areas. If the Pearl Lake Allotment is filled in the future, recreation and livestock conflicts are expected to occur in the Top, Lost , Lost Lake No.3, and No. 5 basins. Livestock would not be herded into the Lawrence Lake basin if the Pearl Lake Allotment is filled, reducing the potential for recreation and livestock conflicts in that area. If measures taken to meet indicator standards result in less presence of cattle, as would occur with changing season of use, reducing numbers of animals, or resting portions of allotments, conflicts between recreation use and livestock would be expected to decrease. With the elimination of cowbells, the impacts of noise from cowbells on visitors' primitive recreation experience would be eliminated.

Sanitation setbacks should improve sanitation conditions around lake shores and at campsites.

Visitors may encounter natural fires in some areas of the wilderness. In some years visitors may be displaced from some areas due to natural fires. Given the glaciated nature of much of the Desolation, the effect on recreation is expected to be minimal in most years.

Visitors will be required to keep their dogs on leashes at all times in the wilderness. Users who like to experience the wilderness with their dogs will be able to continue to do so. Those disturbed by dogs will find some relief from unconstrained dogs. This provision is consistent with El Dorado County ordinances.

Changes to the minimum flight ceiling could result in reductions in noise, but will be dependent on FAA analysis.

Stock use will be limited to a maximum number per group. Additional restrictions on tying stock close to water and campsites will protect social, visual, and resource conditions in those areas. Visitors using stock will be affected by these restrictions, however the impact will be minor. Based on wilderness permit data, stock users comprise under 1 percent of the overnight use and under 3 percent of the day use within the Desolation.

People wishing commercial equestrian services will be able to find such services , however, evidence of such use will decrease in the two more pristine Opportunity Classes. Winter guided use will increase, as will guided use by camps which are proximate to the Desolation. Camp participants at Camp Sacramento, Berkeley Echo Camp, Camp Concord and Stanford Camp will be able to participate in trips guided by camp staff. In addition, organizations and businesses wishing to conduct a commercial trips into the Desolation will be able to compete for such opportunities. The impact of such commercially guided trips on other visitors will depend on the location and timing of the guided trips. Those users who are unable to hike into the wilderness due to physical limitations will be able to enter by horseback.

Trails will be developed in backcountry areas outside the wilderness. The McConnell Lake Loop trail will be removed from maps. Several other little used trails will be returned to natural conditions. Traffic problems at Wrights Lake will be mitigated through improvements at the Twin Lakes trailhead. Analysis will continue on ways to improve sanitation and public safety at the Twin Bridges trailhead.

Indirect:

Encounters with others will remain relatively constant in most of the wilderness; they are expected to increase a small amount in the more remote areas where actual use is lower than that permitted by social standards. The amount of increase will depend on the number of campers willing to travel to more remote destinations when accessible destinations have reached capacity. Encounters in high use areas will decrease from those currently experienced on peak days. Encounters with others on the Eagle Lake Trail will decrease dramatically on most days during the high use season. Day use is expected to increase in those areas without a day use quota.

Overnight use at destinations will remain relatively constant in popular areas during the high use season. Areas will not be filled to over-capacity, and campers will be more able to find their preferred campsite in these areas. More campers will be able to experience their preferred level

of solitude in these areas as more select less visible campsites. Visitors may find more signs of campsites as new campsites are established and unsuitable campsites are "closed".

The campfire closure in most areas will continue to improve visual and resource conditions in most areas of the wilderness.

Conflicts between user groups will decrease due to management guidelines for stock and dogs.

Commercially guided use within the Desolation will lower the number of permits available to the non-guided public on those days when guided trips occur under day use and/or overnight quotas. Guided day trips will increase slightly the number of encounters with large groups on those trails where the guided trips occur.

Development of trails outside, but near the wilderness will provide additional backcountry opportunities for large groups and for those unsuccessful in obtaining wilderness permits. Removal of the McConnell Lake trail from maps will reduce somewhat the number of people getting lost because they expect to find a well defined trail. Overall effects of letting several trails return to natural conditions will be minimal since the trails are little used and are currently hard to find.

Cumulative:

This alternative generally protects current wilderness recreation conditions into the future, while restoring conditions in several areas which currently exceed wilderness conditions.

Over time, the occurrence of prescribed natural fires within many areas of the wilderness will lessen the probability of an intense wildfire. Visitors to these areas may be temporarily displaced by low intensity fires. Some scarring from past light fire activity will become more evident. In areas where natural fires are suppressed, continued fuels buildup may result in intense fires which will temporarily displace visitors, and which will leave obvious scars upon the land. Future visitation in such areas may drop over subsequent years until fire scars are less noticeable.

The availability of solitude will remain relatively constant. Those users who currently find conditions in the Desolation unacceptable will continue to use other areas. In addition, users who don't like increased regulations, who wish to engage in activities being precluded by regulations, and who are unable to obtain permits for the Desolation will be displaced to other wilderness areas and nearby non-wilderness areas. Use in nearby non-wilderness areas is expected to increase, especially in areas with improved trailed access. In general, these areas currently are not close to a saturation point.

This alternative will provide more recreation access than Alternatives 4, 5, and 6, but will provide less than Alternatives 1 and 2. It will, on the other hand, provide more protection of primitive recreation conditions than 1 and 2, and less than 4 through 6.

Alternative 4

Direct:

The effects of implementing this alternative will be similar to those of Alternative 3 with the following exceptions. In general, more areas of the wilderness will be managed for more pristine conditions than in Alternative 3.

To meet the desired standards, the overnight quota will be reduced from 700 to 495 persons per day for the wilderness as a whole. A quota level of 495 is still above the average daily camping use within the Desolation. The reduced quota will reduce use in high use areas and will prevent dramatic increases in use in several remote areas. The quota for most destinations remains the same as in Alternative 3, however, at some destinations the quota drops to reduce the use of highly visible campsites. In general, current overnight use levels will be accommodated, however some individuals will be displaced from popular areas on peak days, especially on weekends. As in Alternative 3, six lakes will be designated for day use only. The effects will be the same as in Alternative 3.

Day use quotas will be established at all trailheads. Initially, 211 day use permits will be available each day. At lesser used trailheads, the quotas will accommodate the current average use levels. In some cases, the trailhead quotas are lower than peak use levels recorded for that trailhead. Day use levels at popular trailheads will be lowered to allow more solitude than currently exists. Those using popular areas will find less crowded conditions than available in Alternative 3. Those entering less popular areas will find conditions similar to those which currently exist. More visitors will be denied permits on peak days than occurs under Alternative 3. There will be less opportunity for hikers to choose an alternate destination within the Desolation as more trailheads are filled to capacity.

Based on an average party size of 3.1, the number of day users expected in the wilderness on high use days will be approximately 640 persons. The total number of users on a typical high use day is expected to be approximately 1150. Both the day use and the overnight quotas will be adjusted as needed to maintain social and resource standards.

The maximum group size in OCs 3 and 4 will be lowered to 12. One percent of the visitors to the Desolation travel in group sizes larger than 12 persons; they will be effected by this reduction in group size. The maximum group size in OCs 1 and 2 will be six, as in Alternative 3.

As in Alternative 3, unsuitable campsites will be "closed" and naturalized, however, more campsites will be closed in this alternative. There will be fewer campsites available, but due to further reduced numbers of campers, parties will be more able to find preferred sites with acceptable levels of solitude. Seven heavily used lakes will have designated campsites. Campers will have their choice of designated sites for camping, but will not have the freedom to camp anywhere.

The effects of the length of the quota season are the same as in Alternative 3.

The campfire closure will continue, as in Alternative 2.

Due to an overall decrease in group size and recreation use, the potential for recreation and livestock conflict would be reduced accordingly. Conflicts are expected to continue in lake basins and riparian areas, but to a lesser degree than in Alternatives 1, 2 and 3. Because cattle would not be herded into Maude, Gertrude and Tyler lake Basins during years with low precipitation amounts and would not be expected to drift there, recreation and livestock conflicts would be eliminated in those areas in the years where the potential for these conflicts is the greatest. Although cattle would not be herded into Lake Sylvia, Lyons, Twin and Grouse Lake areas during years of low precipitation, some recreation and livestock conflict would be expected to continue if cattle drift into these areas. If the Pearl Lake Allotment is filled in the future, recreation and livestock conflicts are expected to occur in the Top, Lost , Lost Lake No.3, and No. 5 basins. Livestock would not be herded into the Lawrence Lake basin if the Pearl Lake Allotment is filled, reducing the potential for recreation and livestock conflicts in that area. If measures taken to meet indicator standards result in less presence of cattle, as would occur with changing season of use, reducing numbers of animals, or resting portions of allotments, conflicts between recreation use and livestock would be expected to decrease. Closure of the Rockbound Allotment will eliminate the potential for conflict between recreation use and grazing that would be expected to occur if that allotment was filled in the future.

As in Alternative 3, sanitation setbacks will improve visual and sanitary conditions at lake shore and campsite areas.

Prescribed fires will be permitted in all areas of the wilderness. In some years, wilderness users may be displaced by active fires. In this alternative natural fires will not be suppressed in popular areas. Therefore, there is a greater likelihood that recreation users will be displaced in some years by active natural fires than in Alternatives 1 - 3. Given the glaciated nature of much of the Desolation, this effect is expected to be minimal in most years.

The direction for dogs and aircraft over flights is the same as in Alternative 3. Dogs will be allowed, but must be on a leash. The Forests will recommend that FAA pursue a minimum flight ceiling over the Desolation. The effects are the same as in Alternative 3.

An additional small number of stock users will be affected by reduction in the maximum number of stock per party (12 in OCs 3 and 4, and 8 in OCs 1 and 2).Those affected will be larger groups wishing to ride and bring in support animals. The effects to stock users can be mitigated by the use of new light weight materials and foods. The overall impact to recreation use is minimal since stock use within the Desolation is under 1 percent of the total overnight use. The visual and resource impacts associated with large groups and large numbers of stock will be reduced under this alternative.

Allocated use for commercial guides will be reduced in proportion to the quota limits for both overnight and day use. Camp participants at Camp Sacramento, Berkeley Echo Camp, Camp Concord and Stanford Camp will be able to participate in trips guided by camp staff. Because the quotas are lower, trailhead and area capacities are expected to be reached more frequently. Therefore, guided use is expected to limit access by the non-guided public to a greater extent than in Alternatives 1 through 3.

The effects of trails management will be the same as under Alternative 3..

Indirect:

Contact with others will be reduced throughout most of the wilderness. The effect will be most pronounced in popular areas. In remote areas, where current social conditions are below those allowed by the standards, contact with others will increase somewhat as users are displaced from more popular areas. The amount of increase will depend on the number of visitors who will select an alternate destination when the more popular areas have reached capacity. Encounters in high use areas will decrease substantially from current peak use conditions and will decrease somewhat from average conditions. Effects on the Eagle Lake trail will be the same as in Alternative 3. Visitors to the Desolation will experience somewhat more pristine visual and resource conditions than in Alternative 3.

Overnight use will remain relatively constant at popular destinations during the high use season. Areas will not be filled to over-capacity, and campers will be more able to find their preferred campsite in these areas. Campers will have more private camping conditions, however fewer campers will be able to use the wilderness. Those users willing to be flexible in planning trips will be accommodated on most days during the high use period. Because the maximum quota is closer to current wilderness use levels, there will be more days when the quota for the wilderness is reached than in Alternatives 1 through 3.

The campfire closure will continue to improve visual and resource conditions in all areas of the Desolation.

As the number of users decreases, the number of recreational shooters, stock users and dogs is expected to decrease proportionately. Conflicts between user groups will decrease due lower numbers of users and the addition of management guidelines for stock and dogs. The overall effect on recreation is not expected to be substantial.

Guided use will increase slightly the number of encounters with large groups.

Lower wilderness quotas will cause more use on the trail system outside of the wilderness.

Cumulative:

Resource conditions within the wilderness will continue to improve with lower use levels. The visual impacts of use by large groups and of heavy use will decrease with time and with the completion of restoration activities. Visitors will experience more natural conditions.

Over time, the occurrence of prescribed fires within the wilderness will lessen the probability of an intense wildfire. Visitors to the wilderness will see more evidence of natural fire and will become more aware of its role in natural Sierran ecosystem processes.

The availability of solitude will improve. Some users who currently find conditions in the Desolation unacceptable may again use portions of the Desolation. Users who don't like increased regulations, who wish to engage in activities being precluded by regulations, and who are unable to obtain permits for the Desolation will be displaced to other wilderness areas and nearby non-wilderness areas. Use in nearby non-wilderness areas is expected to increase, especially in areas with improved trailed access. This increase is expected to be greater under this alternative than under Alternative 3. Less displacement of visitors will occur than under Alternatives 5 and 6.

This alternative will provide more recreation access than Alternatives 5, and 6, but will provide less than Alternatives 1, 2 and 3. It will, on the other hand, provide more protection of primitive recreation conditions than 1, 2 and 3, and less than 5 and 6.

The trail system proximate to, but outside of the wilderness will more rapidly approach the saturation point.

Alternative 5

Direct:

More areas of the wilderness will be managed for pristine conditions than in Alternative 4. Zones within the Desolation will be managed to standards set for Opportunity Classes 1, 2, and 3. There will be no Opportunity Class 4 areas. Visitors will see fewer people and more natural conditions in more areas of the wilderness, including those areas which are easily accessible.

To meet the desired standards, the overnight quota will initially be reduced to 402 persons per day for the wilderness as a whole. This quota level is similar to the current average daily camping levels. However, in comparison to the current quota, it will reduce use substantially in high use areas such as those accessible from Echo Lake and Eagle Lake, and will also reduce use in several remote areas. In some remote areas, the quota will allow use to increase over that which currently exists. To maintain social standards, the quota is lowered at destinations which have little vegetation in order to reduce the use of inter-visible campsites. In general, current overnight use levels will be accommodated. However, more individuals will be displaced from the Desolation on peak days. In addition, more campers will be required to hike further to reach more remote zones as the accessible zones are filled to capacity. As in Alternative 3, six lakes will be designated for day use only. The effects will be the same as in Alternative 3.

As in Alternative 4, day use quotas will be established at all trailheads. Initially, 165 day use permits will be issued each day. At many lesser used trailheads, day use quotas will still allow for average use levels. In most cases, they are lower than the peak use recorded for the trailhead. Day use levels at popular trailheads are lowered significantly to provide much more solitude than currently exists. Those entering less popular areas will generally find conditions similar to those which currently exist. More visitors will be denied permits on more days than occurs under Alternatives 3 and 4. There will be fewer opportunities for hikers to choose an alternate destination within the Desolation than under either Alternatives 3 or 4.

Approximately 900 visitors (510 day users) will be expected to enter the wilderness on a typical high use day. Both the day use and the overnight quotas will be adjusted as needed to maintain social and resource standards.

Group size limits will be 12 in Opportunity Class 3, and 6 in Opportunity Classes 1 and 2.

As in Alternative 3, unsuitable campsites will be "closed" and naturalized. However, more campsites will be closed in this alternative than in either Alternatives 3 and 4. There will be no designated sites in this alternative. Those campers who enter the wilderness will find campsites which provide more protection from the sight and sound of others. There will be less visual evidence of use.

The campfire closure will continue, as in Alternative 2.

The effects of range management on recreation use is expected to be similar to that in Alternative 4. Because recreation use is reduced under Alternative 5, the potential for recreation and range conflict would be slightly less than in Alternative 4.

As in Alternative 3, sanitation setbacks will improve visual and sanitary conditions in lake shore and campsite areas.

Effects of fire management direction will be the same as in Alternative 4.

The direction for dogs and aircraft over flight is the same as in Alternative 3. The effects are the same as in Alternative 3.

Stock users will be affected by additional reductions in the maximum number of stock per party (10 in OC 3, and 6 in OCs 1 and 2).The overall effects to recreation are small, due to the small numbers of stock users within the Desolation. However, the effect on those stock users who do use the Desolation will be substantial. Large groups that ride and also bring in support animals will be most affected. The visual and resource impacts associated with large groups and large numbers of stock will be further reduced under this alternative.

The effects of guided use on quotas will be less than in Alternative 4 because the permits for Camp Sacramento, Berkeley Echo Camp and Camp Concord will not be updated, nor a new permit issued to Stanford Camp to provide for guided use within the Desolation. Camp participants could still obtain their own permits to hike, without a guide, as quotas allow.

As in other alternatives, trails outside the wilderness will be targeted for development. Trails in OC 1 and 2 areas will be removed where possible, providing more remote, cross-country experiences for users. Traffic problems at Wrights Lake will be mitigated through improvements at the Twin Lakes trailhead. Analysis will continue on ways to improve sanitation and public safety at the Twin Bridges trailhead.

Indirect:

Contact with others will be further lowered through most of the wilderness. The effect will be most pronounced in popular areas. In the more remote areas, contact with others will remain close to current levels. Encounters in high use areas will decrease more than under Alternative 4. Use on the Eagle Lake trail will be lower than in Alternative 4. Visitors to the Desolation will experience more pristine visual and resource conditions than in Alternative 4.

Campers will be more able to find their preferred campsite in most areas than in Alternative 4. However, fewer users will be able to use the wilderness. There will be more days when the quota for the wilderness is reached than in Alternative 4.

The indirect effects of the campfire closure, and management guidelines for will the same as in Alternative 4.

As the number of users decreases, the number of recreational shooters, stock users and dogs is expected to decrease proportionately. Conflicts between user groups will decrease due lower numbers of users and the addition of management guidelines for stock and dogs.

The effects of guided use on the non-guided public will be less than the effects in Alternative 4.

Lower use quotas will cause more use on the trail system outside of the wilderness than in Alternative 4.

Cumulative:

Over time, resource conditions within the wilderness will continue to improve with lower use levels. The visual impacts of large groups and heavy use will improve with time and with the completion of restoration activities. Visitors will experience more natural conditions. These cumulative effects will be more pronounced than under Alternative 4, but less pronounced than under Alternative 6.

The cumulative effects of fire management will be the same as those in Alternative 4.

The availability of solitude will improve more than in Alternative 4. More users who find current conditions unacceptable will return to using the Desolation. On the other hand, more users who don't like increased regulations, who wish to engage in activities being precluded by regulations, or who are unable to obtain permits for the Desolation will be displaced to other wilderness areas and nearby non-wilderness areas than under Alternative 4. Use in nearby non-wilderness areas is expected to increase, especially in areas with improved trailed access. This increase is expected to be greater under this alternative than under Alternative 4. Less displacement of visitors will occur than under Alternative 6.

This alternative will provide more recreation access than Alternative 6, but will provide less than Alternatives 1, 2, 3, and 4. It will, on the other hand, provide more protection of primitive recreation conditions than 1, 2, 3, and 4, and less than Alternative 6.

The trail system proximate to, but outside of the wilderness, will more rapidly approach the saturation point than under Alternative 4.

Alternative 6

Direct:

This Alternative has the most pronounced effect on recreation access. It provides the most opportunity for wilderness recreation attributes such as solitude and primitive conditions. Lake basins which are close to the wilderness boundary will be managed to meet Opportunity Class 2 conditions; all other areas will be managed to meet Opportunity Class 1 conditions. Limits on use and other management actions will be adjusted as needed to maintain the Indicator standards set for these Opportunity Class designations.

To maintain standards set for these Opportunity Classes, the overnight quota will be set at 264 persons per day. This quota level will be substantially below the current average use during the high use season. The reduction in use at various locations will vary, depending on the location

and visibility of campsites in each area. At some destinations, limits on use will not change much from those allowed in Alternative 5. However, at some high use destinations, the quota will lower substantially. As in Alternative 3, six lakes will be designated for day use only.

The day use quota will be set at 104 permits issued per day for the wilderness as a whole. At remote trailheads, permitted day use will often be similar or slightly lower than that in Alternative 5. At popular trailheads, use is substantially reduced below that in Alternative 5.

Day use and overnight use are expected to be at capacity at all trailheads on a typical high use day; total use on such a day is expected to be approximately 600 persons.

Those visitors able to obtain permits will find conditions significantly more pristine than the conditions which currently exist. Opportunities for solitude will be outstanding, even at accessible lakes. Many users will not be able to enter the Desolation during the summer due to the limits on use.

The maximum group size will be six for all areas of the Desolation. Parties wishing to have up to 12 persons may do so with a Special Use Permit.

As in Alternatives 3 through 5, undesirable campsites will be "closed", or naturalized. This Alternative will provide desired conditions for the 60 percent of Desolation's campers who indicate that they will like no other campsites within sight or sound of their camp, and the 14 percent who will prefer to see only one other campsite within sight or sound of their camp (Watson and Daigle 1991).

The quota season will be extended from April 1 through October 31. Although recreation users will be able to make reservations, this extension is not expected to limit use on most days. Use will be limited at popular areas during drought years or on such holidays as Columbus Day. This extension will protect social conditions on those exceptional days when use exceeds the standards during the spring and fall.

The effects of management direction regarding campfires will be the same as in Alternative 4.

Effects to recreation use from range management will be the similar to those in Alternatives 4 and 5. Because of further reductions in recreation use under Alternative 6, the potential for recreation and range conflict would be slightly less than in Alternative 5. If portions of allotments are rested as a result of Desired Conditions not being met, potential conflicts between recreation use and grazing in those areas would be eliminated during the rest period.

This alternative provides sanitation measures requiring visitors to pack out their human waste and toilet paper. The effect on recreation will be substantial, requiring them to carry bagging material for removal of feces.

The effects of fire management activities on recreation users will be the same as in Alternative 4; differences due to the use of management ignited fires are expected to be small.

Dogs will be prohibited in the Desolation. Those who consider their dog part of their wilderness experience will be disadvantaged; those who resent the presence of dogs will benefit. Additional reductions to noise from aircraft over flights may be substantial in this alternative, but will depend on action taken by the FAA.

Stock numbers will be limited to 2 per person with a maximum of 6 stock per group. Stock use will be permitted for day trips only. The overall effects to recreation users are small, due to the small numbers of stock users within the Desolation. However, the effect on those stock users who do use the Desolation will be substantial.

People wishing commercially guided services will find opportunities for drop camps only. The effects on recreation users in general are expected to be minimal, due to the low percentage of users who make use of guided services. This alternative will substantially effect those who do make use of such services for pack trips. The effects of guided use on quotas will be less than in Alternatives 4 and 5 because the guided trips into the Desolation for Deer Crossing Camp will be discontinued; Camp Sacramento, Berkeley Echo Camp and Camp Concord permits will not be updated; and a new permit will not be issued to Stanford Camp to provide for guided use within the Desolation. Camp participants could still obtain their own permits to hike, without a guide, as quotas allow.

All but the major trails will be removed, either concentrating use on the existing trails or requiring visitors to use route finding skills to travel cross-country to their destinations. Traffic problems at Wrights Lake will be mitigated through improvements at the Twin Lakes trailhead. Analysis will continue on ways to improve sanitation and public safety at the Twin Bridges trailhead.

Indirect:

Encounters with others will drop dramatically within the Desolation, especially in areas within the wilderness which are most accessible. Areas used for camping will be much less impacted and much more natural appearing. Visual and resource conditions will continue to improve. They will improve most rapidly in this alternative.

Many more users will be denied access to the Desolation. Surrounding areas will sustain much higher use levels, increasing impacts in areas such as the Meiss Country. The extent of these impacts will depend to some degree on the number of trails which are built outside of the Desolation to accommodate displaced users. Additional impacts can be mitigated by improving access and signing at trails which currently exist in areas outside of the wilderness.

With the substantial reduction in overall use, the number of recreational shooters and stock users is expected to decrease proportionately. Conflicts between user groups will decrease due lower numbers of users, management guidelines for stock and prohibition of dogs.

Visual and resource conditions will be improved dramatically by management direction on campfires, natural fire management, dogs, etc. Some people will notice and appreciate improved natural conditions, others will not.

Cumulative:

This alternative provides the most protection for wilderness recreation conditions into the future. Actual use may drop beyond that which is allowed as more users experience frustration obtaining permits. Additional regulations are expected to displace more users to other areas of surrounding National Forests with corresponding increases in use and impacts in those areas. These effects will be higher in this alternative than in any other considered in this planning process.

The cumulative effects of fire management will be the same as in Alternative 4.

4. SOCIOECONOMIC

Components of wilderness use and management that have the potential to affect local socioeconomic factors include the number of users, party size, wood fire use, permitted outfitter-guide use, trail development, and management of grazing, dogs, recreational shooting, and fisheries. The effects of the alternatives are addressed by reviewing the estimated costs of each alternative and the effect of each alternative on local residents, commercial users, wilderness users, and non-users. The effect of the alternatives on specific recreational activities such as equestrian use, are discussed in the recreation section of this chapter. Socioeconomic effects to grazing permittees are discussed in the range section. The socioeconomic effects of the alternatives on outfitter/guides are discussed below.

Potential revenues and costs to the Forest Service vary among the proposed alternatives. Revenues to the Forest Service vary slightly among the alternatives. The greatest increase in revenues to the Forest Service will be realized through implementation of a user fee. The authority to implement such a fee (on a trial basis) has recently been granted by Congress.

Costs vary substantially among the alternatives. The action alternatives identify costs for fire suppression, additional monitoring, facility construction and restoration, in addition to current costs. In all cases, the costs incurred must be weighed against other environmental and social benefits of the alternatives.

Effects Common to all Alternatives

Indirect and Cumulative Effects:

Implementing any of the management alternatives is expected to have minimal effect on the local economy. Wilderness use is a small percentage of the total amount of recreational use which occurs in the county. Any increases or decreases in visitor use resulting from the alternatives will be minor compared to the total amount of non-wilderness recreational use in the surrounding area. In several alternatives, decreases in wilderness use are offset through additional trail construction outside of the Desolation. Most visitors who are unable to obtain a wilderness permit for their preferred Desolation trailhead, either select a less popular trailhead or hike in an area outside the Desolation.

Effects on local employment opportunities or spending will be minor. Changes in revenues to the Forest Service, through fees collected from outfitter/guides or grazing permittees, will be negligible.

Both Forests are committed to the equal treatment of all individuals and social groups in providing services, opportunities, access, and jobs. None of the alternatives considered are expected to have discriminatory effects.

Management Cost:

Factors which affect management costs include construction costs for trails and facilities, the costs of wilderness permit administration, education and information program costs, monitoring costs, restoration costs for campsites, trails and stream flow maintenance dams, and costs for wilderness field staff. Field patrol levels are affected to a certain degree by the number of regulations to be enforced and by visitation levels.

In each alternative, surveys by biologists, botanists, and archeologists will be completed before any site-specific projects are implemented. Costs will be incurred for any needed surveys.

Both Forests will have costs associated with field patrol, permit administration, and information and education in all alternatives. Baseline administrative costs for the two Forests are $213,000. Monitoring of range utilization, soil disturbance, and ecological condition and trend is required in all alternatives at an estimated annual cost of $500.00. Inventories for heritage resources are required in all alternatives, at an estimated cost of $5,000 per year. Annual costs for air quality and water quality monitoring are approximately $15,000 for the two Forests.

Disabled Access:

The number of disabled persons who use the Desolation is unknown, but is estimated to be under 1 percent of total use. Guided equestrian services are available to provide access to the Desolation for the disabled. Certified seeing-eye dogs will be allowed in all areas of the Desolation in all alternatives. Federal policy permits the use of wheelchairs within wilderness when they are medically needed appliances. Trailhead facilities outside of the wilderness will accommodate the needs of disabled visitors. Trails within the Desolation will not be modified to accommodate wheelchairs. This conforms to national policy which provides for disabled access of wilderness, without enhancing trails for such use.

Effects Common to all Action Alternatives

Direct Effects:

Monitoring of the LAC Indicators required in all the action alternatives (1, 3, 4, 5, and 6) will require additional field time by wilderness staff and resource specialists. Initial costs to set up riparian monitoring are estimated to be $9,000.00, while annual costs are estimated at $2,000.00. Campsite monitoring costs and wilderness education costs (brochures, signing, displays, etc.) add an additional $16,500 in initial costs and $6,000 in ongoing costs.

All action alternatives allow the use of prescribed natural fire (PNF). Several alternatives also allow the use of management ignited prescribed fire. Initial costs to write a PNF management schedule are estimated to be $7,000. Two employees with wilderness and/or fire duties will be required each year to monitor fires, at an estimated additional annual cost of up to $14,000. A prescribed fire manager from both the LTBMU and the Eldorado will be committed to managing the program on each administrative unit during that period allowed under each alternative. This allocation of overhead personnel may make them unavailable for fire assignments elsewhere. Additional skills and knowledge on prescribed fire will be required in order to increase the number of qualified Prescribed Fire Managers. Funds to monitor prescribed fires will be

available through the Regional Office in through 1997. After 1997, it is expected that fire suppression funds will be available for prescribed fire monitoring.

Indirect and Cumulative Effects:

The management of PNF, over time, will reduce suppression costs for wildfires.

Alternative 1

Direct Effects:

This alternative will provide current levels of use for existing outfitter/guide operations, and will provide the opportunity for additional guided use within the Desolation. New opportunities will be offered through bid.

Indirect and Cumulative Effects:

Increases in use over time are expected to have minimal effect on the local economy as compared to general forest use. There will be some opportunity for short term employment through the use of contracts to construct trails and facilities.

Local residents will see more evidence of prescribed natural fire in the fall. This will initially increase their concerns about the threat of wildfires, however, over time their concerns should lessen as unnatural build-ups of fuels are reduced in areas bordering the wilderness.

This alternative allows more trail development, larger group sizes, more overnight use, and unrestricted day use. The overnight quota will continue to be administered by trailhead. These factors will benefit those day users, backpackers, and organized groups who are most concerned with recreational opportunity and spontaneity. Larger group sizes will accommodate large organizational groups.

Backpackers who desire solitude and natural conditions will be at a disadvantage under this alternative. Although Indicator standards will be in effect, encounter and campsite standards will be difficult to achieve by indirect means. No quotas will be used to limit day use; it is expected to increase. If Indicator standards are exceeded, the overnight quota will be lowered to meet standards, resulting in fewer opportunities for overnight use. Of the 5 action alternatives, this alternative allows the most crowded conditions overall. Experienced backpackers will continue to be displaced under this alternative.

This alternative will provide more monitoring and protection of natural conditions than Alternative 2, however it provides less protection for natural processes than the other action alternatives. It will not meet the concerns of those non-users who most value protection of natural conditions and processes.

Management Cost:

This alternative will result in the greatest increase in the cost of managing the Desolation. Additional costs will be due primarily to construction and maintenance costs for approximately ten backcountry toilets, and for additional trail and trailhead construction costs.

New trails are proposed for construction within the wilderness. An additional 15 miles of trail may be added to the trail system, at an estimated cost of $225,000. Annual heavy maintenance will occur on all major routes to protect the investment in surfacing and special structures. Annual maintenance costs for the additional trail miles will be $3750.

The cost of backcountry toilet construction can range between $10,000 and $100,000 per toilet. Toilets constructed in the Lake Tahoe Basin drainage will need to meet specific water quality standards. At an estimate of $25,000 per toilet, an estimated 10 toilets needed at popular lakes will cost $250,000. Annual maintenance, including waste disposal, is estimated to be $5,000. Upgrading trailheads will entail a one time cost of up to $70,000.

The PNF program will be in effect each year after Labor Day, fire monitoring will be required during that time. Fire suppression forces will remain at current levels, however, their availability for other assignments may be impacted by the need to confine PNF fires inside Opportunity Class 2 areas within the wilderness.

Additional monitoring, patrol, and administration costs are estimated to be approximately $9,300.00 per year beyond the baseline costs of operation..

Alternative 2 (No Action)

Direct Effects:

This alternative will continue current levels of commercial guided use within the Desolation.

Indirect and Cumulative Effects:

This alternative will continue current management direction. Overall use is expected to increase over time with continued increases in day use and more use of less popular trailheads.

Under this alternative there will be minimal increases to the local economy with increases in use, however such increases are negligible compared to non-wilderness use. Current outfitter/guide use will continue, but is not expected to increase.

Local residents will see some increases in traffic due to cumulative increases in day use. They should expect to see more crowded conditions in popular portal areas over time. Residents close to the Desolation will continue to be concerned about the threat of wildfires.

This alternative benefits day users concerned with recreational opportunities and ease of access. Backpackers seeking solitude and natural conditions will continue to be displaced. This alternative does the least to meet the concerns of non-users who value the protection of natural conditions within the Desolation.

Management Cost:

Management costs will be expected to increase over time, as there are increases in impacts at popular destinations.

There will be no changes to Fire Management staffing, since staffing levels are currently designed and funded to meet this alternative.

Major trail routes are aggressively maintained to Forest standards, but are not located properly to hold to those standards. Costs for adequate trail maintenance are $27,000, a level which is not covered by current funding. Current costs for wilderness patrol and administration, resource monitoring and permit administration are approximately $233,500.00. Costs for permit administration will rise with continuing increases in day use.

Alternative 3

Direct Effects:

This alternative will generally provide for current levels of outfitter/guide use in popular portions of the wilderness, and slightly reduce outfitter/guide use in the more primitive areas of the wilderness. The alternative will benefit those organizations and businesses which are successful in obtaining outfitter/guide permits available for one-time-only trips into the Desolation. Lower group sizes in the remote areas of the wilderness will affect profitability of outfitter/guiding in such areas to the extent that current use is larger than the group sizes permitted. Current information indicates that the effects to outfitter/guides will be minimal.

Indirect and Cumulative Effects:

The reduced overnight quota is still higher than current overnight use for the wilderness as a whole. Day use quotas on popular trailheads are expected to cause some displacement of hikers to other wilderness or non-wilderness trails. Day use quotas will reduce average use slightly at the most popular trailheads; a significant reduction of day use will occur at the Eagle Falls Trailhead. Effects to the local economy are expected to be negligible.

Residents adjacent to Opportunity Class 2 areas will see more evidence of prescribed burning outside the wilderness and prescribed natural fires inside the Desolation. This will initially increase their concerns about the threat of wildfires, however, over time they will benefit as unnatural build-ups of fuels are reduced. Those residents near other portions of the wilderness will continue to experience unnatural fire conditions.

This alternative emphasizes trail construction in areas adjacent to wilderness, smaller group sizes in the more remote areas of the wilderness, current levels of overnight use, and quotas on day use at popular trailheads. The overnight quota will be administered by zone. These factors will provide use at less popular trailheads for those day users and organized groups who are concerned with recreational opportunity and spontaneity. Day users at popular trailheads will be affected by day use quotas. The reduced party size limit in remote areas will adversely affect organized groups' use of these areas; the effect will be minor since this party size will accommodate more than 93 percent of the parties currently using the Desolation.

Backpackers who desire solitude and natural conditions will be able to better find these conditions in remote areas. Experienced backpackers may return to using the more remote areas of the Desolation. Those who enjoy campfires as part of their wilderness experience will have the opportunity in a few areas.

This alternative will provide more monitoring and protection of natural conditions than Alternatives 1 and 2, therefore, it meets more of the concerns of those non-users who most value protection of natural conditions and processes than do Alternatives 1 and 2.

Management Cost:

This alternative will add to the cost of managing the Desolation through increased costs for monitoring and wilderness administration.

The prescribed fire and PNF management proposed in this alternative will require additional staffing, as described in the consequences common to all action alternatives.

The alternative emphasizes the construction of new trails adjacent to the wilderness. An additional 10 miles of trail may be built, at an estimated cost of $250,000. Annual maintenance costs for additional trail miles will be $2,000. An estimated 2 miles of trail will be restored, at a cost of $13,000. The trail system should stop deteriorating and progress should be made on reducing the trail maintenance backlog. Removal of the Eagle Falls bridge will entail a cost of an additional $30,000.

Additional monitoring, patrol, and administration costs (above baseline) are estimated to be $25,500, including the costs for moving and closing campsites. Additional costs will be incurred in operating a day use quota. Permit administration and patrol costs may be offset through fees for permits and reservations. The amount of the possible offset is unknown at this time.

Alternative 4

Direct Effects:

There are no direct socioeconomic effects of this alternative.

Indirect and Cumulative Effects:

Monitoring costs in this alternative will be similar to those in Alternative 3. Wilderness administration costs will increase beyond current costs due to increases in patrol and education needs, campsite restoration, and administration of a day use quota. Costs specific to this alternative are listed below.

The overnight quota is further reduced from Alternative 3; however, it is still higher than current average overnight use on weekends. Day use quotas will cause some displacement of hikers to less popular wilderness trails, or to non-wilderness trails. Day use quotas will reduce use on weekends; primarily due to reductions in day use levels at the popular trailheads. Reductions to the Eagle Falls trailhead will be the same as in Alternative 3. Effects to the local economy are expected to be negligible due to the small numbers of people involved in comparison to non-wilderness use in the area.

Residents adjacent to all areas of the Desolation may see more evidence of prescribed burning outside the wilderness and prescribed natural fires inside the Desolation. This will initially increase their concerns about the threat of wildfires, however, over time local residents will benefit as unnatural build-ups of fuels are reduced.

Outfitter/guide activities currently permitted in the Desolation are not expected to be affected by day use quotas since guided day use is limited to use by camps. There may be minimal effects to profitability of overnight operations due to a 29 percent reduction in overnight use within the wilderness; this reduction may be mitigated by additional permitted use in non-wilderness areas of the Forests. Lower group sizes in the remote areas of the wilderness will affect profitability of outfitter/guiding in such areas to the extent that current guided groups are larger than the group sizes permitted. Current information indicates that the effects to outfitter/guides will be minimal.

As in Alternative 3, this alternative emphasizes trail construction in areas adjacent to the Desolation, smaller group sizes in the more remote areas of the wilderness, and levels of overnight use which are similar to current use levels. The overnight quota will be administered by zone, requiring that some backpackers hike to more distant destinations than is currently the practice. Some backpackers may be denied their first choice of destination when quotas are exceeded. The extended quota season will make it more difficult for users to enter at popular trailheads later and earlier in the season.

Day users may be displaced to less popular trailheads when quotas at popular trailheads have filled. Day users will have to plan day hikes in time to reserve space for their chosen trailhead. Those who are concerned with recreational opportunity and spontaneity will be at a disadvantage. A further reduction in group size will adversely affect large, organized groups.

In comparison to Alternatives 1-3, lower use levels will provide more solitude and natural conditions within the Desolation. Those preferring maximum freedom will be impacted due to regulations on wood fires, recreational shooting, and dogs. Those users desiring minimal evidence of humans will have more advantage.

This alternative will provide more protection of natural conditions than Alternatives 1 - 3. Therefore, it meets more of the concerns of those non-users and users who most value protection of natural conditions and processes.

Management Cost:

Management costs for monitoring, trail construction and maintenance, and trail restoration will be the same as those in Alternative 3. The trail maintenance backlog should be reduced more quickly as lower use levels reduce trail impacts. There will be additional costs if trailhead parking capacities are adjusted. If the Eagle Falls Bridge is removed, an additional $30,000 cost will be incurred. Campsite closure costs are estimated at $8,000.00.

The prescribed fire and PNF management proposed in this alternative will require additional staffing, as described in the consequences common to all action alternatives.

Additional monitoring, patrol, and administration costs (above baseline) are estimated to be $23,000. Reductions in use will result in lower permit administration costs, however, these savings will be offset by increased costs for quota administration. Permit administration and patrol costs may be offset through fees for permits and reservations. The amount of the possible offset is unknown at this time.

Alternative 5

Direct Effects:

The amount of use permitted to outfitter/guides will be further reduced in this alternative.

Indirect and Cumulative Effects:

Further reductions in both the overnight quota and the day use quota will impact some users, especially those valuing recreational opportunities and spontaneous access. Effects to the local economy are expected to be minor.

Effects on local residents will be similar to those in Alternative 3, with the exception that they can expect to see somewhat less crowding in portal areas.

The effects on 2 equestrian outfitter guides outfitter/guides and one camp will be similar to those in Alternative 4. A further reduction in the overnight quota will further impact their operations to the extent that wilderness use is replaced with non-wilderness use. Three camps will not have Special Use Permits adjusted to authorize guided use within the Desolation. The monetary effect on these camps is expected to be minimal since camp participants currently also take non-guided trips into the Desolation and will continue to do so. The camps do not charge an extra fee for staff guided trips.

As with Alternatives 3 and 4, this alternative emphasizes trail construction in areas adjacent to wilderness, however, remote trails may be obliterated and all trails will be maintained to a lesser standard. In comparison to Alternatives 1-4, this alternative will impact the casual day user to a greater extent and will provide more benefits to those backpackers who value a primitive wilderness experience. Effects to organized groups will be similar to Alternative 4.

Day users will be further impacted by this alternative; they will be displaced to less popular trailheads and non-wilderness areas, such as the Meiss Country, when quotas at popular trailheads have filled. An increase in the number of zones with a group size of six will adversely affect large, organized groups.

In comparison to Alternatives 1-4, lower use levels will provide more solitude and natural conditions within the Desolation. Impacts to users will occur due to regulations on wood fires, recreational shooting and dogs.

This alternative will provide more protection of natural conditions than Alternatives 1 - 4. Therefore, it meets more of the concerns of those non-users and users who most value protection of natural conditions and processes.

Management Cost:

Cost increases in this alternative are expected to be higher than in Alternatives 2-4, but less than in Alternatives 1 and 6. Cost increases over Alternative 4 will result from implementing stricter quotas and regulations, and from completing additional trail and campsite restoration.

The prescribed fire and PNF management proposed in this alternative will require additional staffing, as described in the consequences common to all action alternatives.

Management costs for monitoring and trailheads will be the same as those in Alternative 3. Costs for trail maintenance will decrease and costs for trail restoration will increase. The costs for trail removal and restoration of trails will depend on the miles of trail which are physically closed and restored. Costs can be as much as $350,000.00. Costs for campsite restoration and revegetation are expected to be $14,000. If the Eagle Falls Bridge is removed, an additional $30,000 cost will be incurred.

Additional monitoring, patrol, and administration costs (above baseline) are estimated to be $27,600. Additional costs will be incurred in operating a day use quota. Permit administration and patrol costs may be offset through fees for permits and reservations. The amount of the possible offset is unknown at this time; however, the revenues generated will be expected to be less than in Alternative 4 due to lower use levels.

Alternative 6

Direct Effects:

The effect of this alternative on those outfitter/guides who will no longer provide services within the Desolation will be negligible. Deer Crossing Camp use will continue at non-wilderness campsites. The further reduction in group size and limits on guided overnight rides are expected to reduce profits for Camp Richardson and Cascade Stables.

Indirect and Cumulative Effects:

Reductions in the overnight quota will impact campers, especially those valuing recreational opportunities and spontaneous access. Day use will be limited to approximately one third the current average use. Day users will be highly affected by limited opportunities. Both day-use and overnight use will be displaced to nearby non-wilderness areas such as the Meiss Country. Effects to the local economy are expected to be minor.

Effects to local residents will be similar to those in Alternative 3. They can expect to see less crowding in portal areas.

All but the major trails will be removed, concentrating use by less experienced users to the major access trails. Those desiring to travel to areas away from major trails will need route-finding skills since signing will be eliminated and travel will be cross-country. Use by less experienced users, especially day users, will be discouraged by the more primitive conditions.

An increase in the number of zones with a group size of six will adversely affect large, organized groups.

This alternative provides the most protection for solitude and natural conditions within the Desolation. Impacts to users due to regulations on wood fires and recreational shooting will be the same as in Alternative 5. It impacts those who like to travel with their dogs to a greater extent than any other alternative.

Alternative 6 provides the greatest protection and restoration of natural conditions and processes, and the highest degree of solitude and challenge. The alternative best meets the concerns of both users and non-users who most value these attributes.

Management Cost:

Other than Alternative 1, this alternative will entail the greatest increase in management costs. Major cost increases will result from implementing stricter quotas and regulations, from removing all but the major trails, from removing the Eagle Falls bridge, and from additional campsite restoration. Costs for trail closures can rise as high as $460,000; costs for trail maintenance will be reduced. Campsite restoration and revegetation will be approximately $15,000. Removal of the Eagle Falls bridge will entail an additional $30,000.

Management costs for monitoring will be the same as those in Alternative 3. Additional patrol and administration costs are estimated to be similar to costs in Alternative 5. Revenues generated from permit and reservation fees will decline further due to lower allowed use levels. Fees will offset the costs of permit administration and patrolling.

C. UNAVOIDABLE ADVERSE EFFECTS

In any alternative there will be some unavoidable adverse impacts to the wilderness environment due to human uses and their associated impacts. Erosion from trail construction and use will occur, as will soil deterioration in campsite areas. Some reduction of air quality will occur due to auto emissions from vehicles used to access wilderness trailheads. Implementing the alternatives (1 and 2) which allow the greatest amount of human uses will result in the most severe impacts. Alternatives 3 through 5 will provide increasingly fewer unavoidable effects. Impacts will be least severe under Alternative 6.

D. RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The relationship between the short-term uses of the environment and the maintenance and enhancement of long-term productivity is complex. Forest management, as directed by the LRMP, is both a short term and a long-term venture. Direction provided by the Wilderness Act of 1964, however, stipulates that wilderness management emphasize maintenance of long-term productivity through protection of naturally functioning ecosystem processes.

Within a wilderness setting, long-term productivity can relate to the ability of the area to provide a natural, undegraded wilderness setting year after year and generation after generation. Short-term uses refer to specific annual activities such as recreation (camping, hiking, skiing, etc.) and livestock grazing. Within a wilderness framework, each of the alternatives provides a different relationship between short-term uses and long-term productivity. Alternative 2 (No Action) provides the most for unrestricted short-term uses at the expense of the long-term protection of ecosystem processes. Alternative 1 also gives priority to short-term uses, but provides additional standards to protect natural ecosystem conditions. Alternatives 3 through 5 provide increasingly restrictive measures on the amount and type of use in order to protect long-term naturalness. Alternative 6 is at the opposite end of the spectrum, strictly limiting public use to provide for pristine conditions.

E. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitment of resources refers to resources that are renewable only over a long period of time, such as soil productivity, or depletable resources, such as cultural properties and minerals. This concept also includes the loss of future options. Irretrievable commitment of natural resources is the production or use of natural resources that is lost because of management decisions made in the alternative.

Alternatives 1 and 2, with the highest use levels and associated impacts to soils, will result in the greatest irreversible commitment of resources. Alternative 6 has the fewest irreversible commitments.

All action alternatives propose to implement Indicator standards which may reduce the amount of forage available for grazing. To the extent that grazing is reduced, there is an irretrievable commitment of natural resources in comparison to present grazing levels. This forage use can be increased again in the future, based on future forest planning efforts. However, the outputs between now and any future change will not be available for use. Each of the action alternatives, therefore, has irretrievable losses to the extent that forage utilization is reduced.

F. ENERGY REQUIREMENTS

The major opportunities for limiting energy consumption relate to alternatives which lower the number of users within the Desolation. The amount of fuel used in transportation to and from the wilderness is directly related to changes in use levels. Energy savings will be lost to the extent that displaced users select surrounding areas for hiking and camping.

G. POSSIBLE CONFLICTS WITH PLANS AND POLICIES OF OTHERS

Possible conflicts between public agencies begins with differing management goals and policies. Differences in agency goals may be tied in part to the different publics that the agencies serve. However, a principle of federal and state resource agencies is the protection, use and conservation of natural resources to best meet the needs of the public.

The 1964 Wilderness Act provides that designated wilderness be managed for solitude and naturalness. At times, these management goals may conflict with the goals of other agencies. Possible conflicts may occur with CDFG wildlife and fisheries management goals within the Desolation. Both agencies are working together to resolve conflicts under a Memorandum of Understanding for the Desolation which tiers to regional and national agreements with state fish and wildlife agencies. Dialog is ongoing.

Other agencies which can be affected by Desolation management decisions include the El Dorado County Sheriff's office, the Sacramento Municipal Utility District, and El Dorado County (through acquisition of the El Dorado Project (FERC # 184) and the Lake Aloha hydroelectric facilities.

H. SPECIFICALLY REQUIRED DISCLOSURES

1. Effects of the Alternatives on Prime Farmland, Rangeland and Forest Land

All alternatives are in keeping with the Secretary of Agriculture's Memorandum 1827 for prime land. Wilderness designation precludes the use of lands within the Desolation as either farmland or timber land. All action alternatives improve rangeland condition through the application of standards and guidelines to protect riparian and range resources.

2. Effects of the Alternatives on Wetlands and Floodplains

Within the Desolation, there are small wetlands (primarily in the form of wet meadows) and minor floodplains associated with seasonal creeks. Unnatural changes to wetland and floodplain structure within the wilderness are primarily influenced by recreation (trail and campsite location and use) and grazing.

In locations where trails cross wetlands, trail tread may be widened or multiple trails may form. Campsites within wetland areas are typically used after wet meadows have dried out. Wetland impacts in these areas are generally limited to loss of vegetation and soil compaction. Impacts are discussed in the soils and vegetation sections.

Wetland and floodplain structure and function may be altered through soil disturbance and vegetation removal due to grazing. Current LRMP standards and guidelines provide direction for reasonable protection of these areas. All action alternatives will improve conditions through implementation of additional standards and guidelines. Impacts to wetlands and floodplains will be minimal under all alternatives.

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LIST OF PREPARERS

List of Preparers/Other Participants

Interdisciplinary Team

Name	Area of Expertise	Education	Years of Experience
Karen Leyse Former Team Leader ELD Wilderness Manager	Wilderness Management	B. A. Geography Univ. of Ca., Davis Elem. Teach Cred. Ca. State Univ., Sacramento	7
Diana Erickson Current Team Leader ELD Landscape Architect	Recreation Management	B. S. Landscape Architecture Washington State University	17
Lori Allessio LTB Asst. Wildlife Biologist	Wildlife Sensitive Plants	B.S. Natural Resources Sciences & Mgmt Univ. of Ca., Davis	10
Dianna Brink ELD Range Con.	Range	B.S. Forestry (Range Mgmt.) Univ. of Montana	7
Christine Christiansen ELD Hydrologist	Hydrology, Watershed management	B.S. University of Arizona	7
Krista Deal Pacific RD Archeologist	Archeology	M.A. Anthropology Ca. State U., Chico B.A. Anthropology Univ. of Az., Tucson	19
George Elliott ELD Fisheries Biologist	Fisheries & Aquatic Res.	B.A. Zoology Univ. of Ca., Los Angeles	22
Gayle Ellis LTB	Fisheries & Aquatic Res.	A.S.	7
Sue Farley ELD Soil Scientist	Soils, Wilderness Mgmt.	B.S. Soil Science Ca. Polytechnic State Univ., San Luis Obispo	15
Karen Finlayson ELD Information Center Director	Recreation, Visitor Services	B. S. Natural Res., Recreation Humboldt State Univ	25
Mike Foster ELD Forest Botanist	Botany, Sensitive Plants	B.As. Biology & Chemistry Ca. State Univ., Chico	7

Name	Area of Expertise	Education	Years of Experience
Charis Genter Pacific RD, Asst Bio.	Wildlife	B.S. Wildlife & Fisheries Bio. Univ. of Ca., Davis	4
Andrea Holland-Sears Former Zone Air Res. Coordinator	Air Resources, Hydrology	B.S. Watershed Science Utah State Univ.	18
Arnold James Soils Scientist, Mendocino NF ID Team 10/92-4/93	Soils	B.S.Natural Resource and Soils Univ. of Wisc., Stevens Pt.	27
Don Lane LTB Supervisory Recreation Forester	Recreation, Trails	M.S. Land Use Planning Univ. of Ca., Berkeley B.S. Forest Mangement Univ. of Nevada, Reno	25
Patti Lesky Former Asst. Forest Botanist ELD	Botany, Sensitive Plants	B.A. Botany Sonoma State Univ.	6
Michael Lowry LTB Hydrologist ID Team through 10/95	Hydrology	M.S. Forest Hydrology Oregon State Univ. B.S. Geology Northern Arizona Univ.	8
John McMillan Pacific Fire Mgmt. Officer, ELD	Fire/Fuels Management	B.S. Wildlife Management Ca. State Polytechnic Univ., San Luis Obispo	25
John Nadolski ELD	Archeology	B.S. Anthropology Loyola University, Chicago M.A. Anthropology University of Illinois A.B.D. Archeology Northwestern University, IL	20
Julie Perrochet LTB (Through 1994)	Fisheries & Aquatic Resources	B.A. Natural Sciences M.A. Geography	10
Rich Platt Pacific Resource Officer	Recreation, Range	B.S. Natural Resource Mgmt. Ca. State Polytechnic Univ., San Luis Obispo	25
Don Yasuda Pacific Wildlife Biologist	Wildlife	B.S. Wildlife & Fisheries Biology Univ. of Ca., Davis	8

Name	Area of Expertise	Education	Years of Experience
Bill Walker Forest Trails Coordinator	Trails engineering	B. S. Natural Resource Conservation Univ. of Connecticut	26

Other Participants and Contributors

Nicole DeFever, Wilderness Ranger, GIS, Pacific RD, 1992-1993

JoAnn Fites, Zone Ecologist, Eldorado, Tahoe, & Plumas National Forests and LTBMU

Sue Gethen, Forestry Technician, Pacific RD

Ken Karkula, Recreation Officer, LTBMU

Lester Lubetkin, Recreation Officer, Eldorado NF

Susan Miller, Ecologist, Eldorado NF

Annette Parsons, Geographic Information Systems, Eldorado NF

Beth Paulson, Environmental Coordinator, Eldorado NF

Cindy Podsiadlo, Ecologist, Eldorado NF

Beth Plymale, Air Resources, Los Padres NF

Jeff Reiner, Forest Fisheries Biologist, LTBMU

Sue Rodman, Geographic Information Systems, Eldorado NF

Chris Runner,Lead Wilderness Ranger, Pacfic RD, 1992

Susie Urie, Ecologist, Tahoe NF

GLOSSARY

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abiotic environment - Environmental components including climatic conditions such as temperature and moisture regimes, and inorganic substances supplied by mineral soil.

accelerated erosion - Erosion rates which are increased as the consequence of human activity. The causes may include grazing and trail use. The rate of erosion can be increased by activities other than those of humans. Fire that destroys vegetation and triggers erosion has the same effect. Within wilderness, a lightning-caused fire might cause accelerated erosion, however that accelerated erosion would be considered natural.

acid rain - A phenomenon which occurs when sulfer dioxide and nitrogen oxides are chemically transformed into acidic sulfates and nitrates during atmospheric transport and are subsequently deposited downwind as acid precipitation (either rain or snow), acid fog, or as acid particles.

acidification, chronic - Constant conditions which cause waters to be acidic.

acidification, episodic - Conditions which cause waters to become intermittently acidic.

aggrade - To raise the grade (of a river valley or stream bed), as by depositing detritus.

Air Quality Related Value (AQRV) - A feature or property of an area that may be affected by air pollution.

allocated use - When a quota system is in place, a specified number or percentage of wilderness permits are reserved by outfitters and guides, prior to permits being available to the general public.

Allotment Management Plan (AMP) - The document that specifies the actions to be taken to manage and protect the range resource. The Allotment Management Plan guides the implementation of the standards and guidelines for range and other resources which are in the Forest LMPs.

AMP - Allotment Management Plan.

Animal Unit Month - The amount of forage required by a mature cow for one month, based upon an average daily forage consumption of 26 pounds of dry matter per day.

anthropocentric - A philosophical viewpoint which sees wilderness primarily from a human oriented perspective. The naturalness of the wilderness is less important than facilitating human use and convenience. Programs that would alter the physical and biological environment to produce desired settings are encouraged.

anthropogenic - Human-caused.

AQRV - Air Quality Related Value.

AUM - Animal Unit Month.

biocentric - A philosophical viewpoint which emphasizes the maintenance of natural systems at the expense of recreational and other human uses, if necessary, because wilderness values depend upon naturalness and solitude. The goal of this philosophy is to permit natural ecological processes to operate as freely as possible, because wilderness values for society ultimately depend on the retention of naturalness and solitude.

biodiversity - The distribution and abundance of different plant and animal species and communities in an area.

Biological Assessment (BA) - A document that evaluates the potential effects of proposed actions of Federal agencies on threatened or endangered species and their critical habitat.

Biological Evaluation (BE) - A document that evaluates the potential effects of proposed Forest Service actions on threatened, endangered, sensitive, or proposed species and their habitat.

biotic environment - Biological members of an organism's habitat that interact with it, including competitors, predators, and parasites.

CAAQS - California Ambient Air Quality Standards.

campsite area - An area affected by camping, which may be indicated by flattened vegetation, vegetation loss, or soil compaction.

CDFG - California Department of Fish and Game.

cumulative effects - The combined effects of past, present, proposed, and reasonably foreseeable actions.

DEIS - Draft Environmental Impact Statement.

DFC - Desired Future Condition.

direct effects - Effects that occur at the same place and time as the triggering action.

dunnage - Baggage; with recreational stock use, the term applies to carrying supplies.

ecological condition - The character of the vegetative cover and soil under multiple-use, in relation to its potential. Comparison is made as to its current status versus what the Potential Natural Community (PNC) could be.

ecosystem - A system formed by the interaction of living (biotic) organisms with their environment, including the abiotic (non-living) components.

ecotype - A genetically differentiated subpopulation that is restricted to a specific habitat.

ENF - Eldorado National Forest.

Environmental Impact Statement - A required report for all federal actions that will lead to significant effects upon the quality of the human environment. The report must be systematic and interdisciplinary, integrating the social and natural sciences as well as the design arts in planning and decision making.

extirpate - To remove totally, exterminate.

FAA - Federal Aviation Administration.

FEIS - Final Environmental Impact Statement.

FERC - Federal Energy Regulatory Commission.

fire dependent - An ecosystem evolving under periodic perturbations by fire and which consequently depends on periodic fires for normal ecosystem functioning.

fire regime - The kind of fire activity (frequency and intensity) that characterizes a specific region.

habituate - To accustom (a person, an animal) as to something.

heritage resources - The artifacts, and signs of past human activities; they provide a record of past human actions.

hydrophobic - Water repelling; soils which become hydrophobic due to intense fires change surface characteristics in a way which repels water.

IDT - Interdisciplinary Team.

indicator - A specific variable of resource or social conditions; it can be measured and also often indicates the status of other resource or social conditions; used in the Limits of Acceptable Change framework.

indirect effects - Those effects occurring at a later time or at a distance from a triggering action.

intermittent stream - A recurrent stream, in which waters flow only part of the time.

Land and Resource Management Plan (LMP) - The plan which provides direction for all resource programs, practices, uses, and protection measures through establishment of both Forest-wide and management area specific standards and guidelines, completed with full NEPA disclosure, also called a Forest Plan.

"Leave No Trace" - A national program which provides education on minimum-impact camping and travel skills; the program was developed as a partnership between the National Outdoor Leadership School, the Forest Service, the Bureau of Land Management, and the National Park Service.

Limits of Acceptable Change (LAC) - A framework for establishing acceptable and appropriate resource and social conditions in recreation settings.

Management Indicator Species - Wildlife species whose population status and trend in a specific habitat type indicates the population status and trend of other wildlife species dependent upon that habitat type.

mesic - Having or characterized by a moderate amount of moisture.

minimum pool - The amount of water left in an impoundment after the water held by the dam has been released; in lakes with dams, the minimum pool generally is consistent with the extent of the original lake.

MIS - Management Indicator Species.

mitigation - An action taken to avoid, minimize, eliminate or rectify an adverse effect of a management action.

monitoring - Systematic gathering, comparing, and evaluation of data.

natural recruitment - The number of young of a species which enter the population each year as a result of reproduction or migration.

NEPA - National Environmental Policy Act.

nondegradation - A concept that calls for the maintenance of existing environmental conditions if they equal or exceed minimum standards and for restoration of conditions below minimum standards.

NRCS - Natural Resources Conservation Service (formerly Soil Conservation Service).

NWPS - National Wilderness Preservation System.

(OC) - Opportunity Class.

OHV - Off highway vehicle.

Opportunity Class - A qualitative definition of the resource, social and management conditions which are acceptable for an area. Based on an environmental modification spectrum, a concept that describes a continuum of settings which range from the totally modified landscape of a modern city to those remote and pristine reaches of a country. Related to the Recreation Opportunity Spectrum.

outfitter/guides - Individuals, including their employees, instructors, or agents, that provide guiding (such as supervision, protection, education, training, packing, touring, subsistence, interpretation, or other assistance to individuals or groups in their pursuit of a natural resource-based outdoor activity) or outfitting services for pecuniary remuneration or other gain.

perennial stream - A stream which flows throughout the year.

PF - prescribed fire.

pH - A measure of how acidic or alkaline (basic) a solution is on a scale of 0-14 with 0 being very acidic, 14 being very alkaline, and 7 being neutral.

PG&E - Pacific Gas and Electric.

plant communities - Assemblages of plant species which typically occur together in an ecologically related fashion in a definite region.

PNC - Potential Natural Community.

PNF - Prescribed Natural Fire.

PNV - Potential Natural Vegetation.

Potential Natural Community - Under current environmental conditions, the biotic community that would be established if all successional sequences of an ecosystem were completed without additional human-caused disturbances.

Potential Natural Vegetation - The assemblage of plant species that would occur at a site following an extended period of time without major disturbance (such as a stand replacing fire); such plant assemblages are classified and mapped.

prescribed fire - A wildland fire ignited by humans under preplanned, specified conditions, to accomplish specific, planned resource management objectives.

prescribed natural fire - A wildland fire which is ignited by natural causes (lightning) which is allowed to burn under planned, specified conditions in specific areas.

quota - A limit on the number of persons allowed to enter (or permits issued for) the Desolation on each day during a specified time frame, generally the high use season.

Recreation Opportunity Spectrum - A planning approach identifying a range of recreational environments across a spectrum ranging from urban recreation areas, rural countryside, highly developed campgrounds, intensively managed multiple-use forests, recreation and scenic areas, roadless wildlands, and wilderness. The ROS defines six classes: Primitive, Semiprimitive Nonmotorized, Semiprimitive Motorized, Roaded Natural, Rural, and Urban.

Recreation Visitor Day - A unit of measure for recreation use, one RVD equals one person using an area for twelve hours.

recreational stock - Saddle and pack stock used by the public and by outfitter/guides.

rest - Leaving a pasture or allotment ungrazed, thereby foregoing grazing of one forage crop. Normally rest implies absence of grazing livestock for a full growing season or during a critical portion of plant development.

riparian - Situated on the bank of a river or other body of water.

ROS - Recreation Opportunity Spectrum.

RVD - Recreation Visitor Day.

scoping - The process of gathering public input to a proposed project, used in determining the issues to be examined in analysis and in determining the level of complexity of the analysis.

secchi depth - The depth at which a secchi disk is visible when lowered into the water.

sensitive species - Species designated by the Regional Forester as needing special management to prevent them from becoming threatened or endangered.

seral stage - A biological community which represents a single developmental stage in ecological succession.

service day - A unit of measure for use by outfitter/guides; one day, or any part of a day for each individual or client accompanied or provided services, including transportation services, by an outfitter or a guide.

SMUD - Sacramento Municipal Utility District.

successional changes - Long term, predictable trends of an ecosystem, as opposed to short-term cyclical changes.

suitable range - That area which is accessible to livestock, produces forage, or has inherent forage-producing capabilities, and can be grazed on a sustained yield basis in harmony with the other resource uses and values under reasonable management goals.

trampling - Walking on vegetation and soil by humans, packstock and livestock which may cause: abrasion of vegetation, abrasion of surface soil organic layers, and compaction of soils.

trend - The change in ecological condition, if the change is toward the Desired Future Condition, the rangeland is improving and the trend is upward.

unallocated use - Use by outfitter/guides which results from being contacted by wilderness visitors who have obtained a wilderness permit through normal means and wish guided service into their destination.

unsuitable range - That area which has no value for or should not be used by livestock because of unstable soils, steep topography, dense timber or brush, barrenness, or inherently low forage productivity. The precedence of livestock or past signs of use by livestock does not rule out the possibility that the area is unsuitable range.

untrammeled - Not subject to human controls and manipulations that hamper the free play of natural forces. A word describing desired wilderness conditions used in the Wilderness Act.

USDA - United States Department of Agriculture.

USDI - United States Department of the Interior.

USFS - United States Forest Service.

USFWS - United States Fish and Wildlife Service.

utilization (allowable use) - A predetermined amount of current forage production that is to be removed and/or soil disturbance which is acceptable under a given set of circumstances in order to accelerate rangeland improvement.

visibility - An Air Quality Related Value which COngress has singled out for protection in the Clean Air Act.

VOC - Volatile Organic Compounds.

WHR - California Wildlife Habitat Relationships.

wilderness - The legal definition is found in the Wilderness Act of 1964, Section 2c (P.L. 88-577): "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." This legal definition places wilderness on the "untrammeled" or "primeval" end of the environmental modification spectrum. Wilderness is roadless lands, legally classified as component areas of the NWPS, and managed so as to protect its qualities of naturalness, solitude, and opportunity for primitive types of recreation.

wilderness dependent - Dependent on wilderness conditions of naturalness and solitude.

wilderness management - Government and citizen activity to identify - within the constraints of the Wilderness Act - goals and objectives for classified wildernesses and the planning, implementation, and administration of policies and management actions to achieve them. Involved the application of guidelines and principles to achieve established goals and objectives, including management of human use and influences to preserve naturalness and solitude.

wildfire - A human-caused fire which has not been planned or ignited by management; a fire which will be suppressed.

APPENDIX A

RANGE OF MANAGEMENT ACTIONS TO BE TAKEN IF LAC STANDARDS ARE EXCEEDED

INDICATOR - Number of groups encountered per day while traveling.

Actions to be taken if Standards are Exceeded

- De-emphasize attraction of excessively used areas; redirect visitors to non-wilderness trails.
- Improve signing, parking and promotion of nearby non-wilderness trails.
- Develop additional nearby trails outside the wilderness.
- Adjust or remove administrative and informational signing. -Reduce trailhead access, parking and road signs.
- Lower trail maintenance levels to discourage use.
- Lower (or implement) day use quotas in areas where standards are exceeded. -Lower overnight quotas for areas where standards are exceeded.
- Allow only day use.

INDICATOR - Number of occupied campsites within sight or sound of a campsite.

Actions to be taken if Standards are Exceeded

- Inform the public of "Leave No Trace" ethics and practices, including site selection (the use of screened sites located away from lakes, streams, meadows, and other visitors) and noise considerations through public service messages, trailhead notices, informational brochures and personal contact.
- De-emphasize attraction of excessively used areas; redirect visitors to trails and destinations outside of wilderness.
- Adjust or remove administrative and informational signing.
- Reduce access, parking and road signs at trailheads leading into areas where standards are exceeded.
- Close campsites which are undesirable or unacceptable, or are in excess of the desired number of sites for each area. Campsites which will be targeted for closure include those sites which are: too close to water, trails or other campsites; highly visible; in riparian areas or on other fragile ground; or excessively impacted with erosion problems. Before eliminating campsites, consider if this action will cause formation of new campsites.
- Revegetate damaged areas and post site restoration messages.
- Lower overnight quotas in areas where standards are exceeded.
- Require users to camp in designated campsites.

INDICATORS **1. - Maximum square feet of devegetated area in campsites.**

2. - Frissell Campsite Condition

Actions to be taken if Standards are Exceeded

- Increase Leave No Trace visitor education and signing.
- Redirect visitors to opportunities outside the wilderness.
- Increase patrol of the area.
- Adjust or remove administrative and informational signing.
- Reduce access, parking and road signs to the area.
- Implement lower group size limits.
- Review stock use of the area and implement needed restrictions on this use.
- Designate campsites.
- Restore campsites which exceed standards.
- Reduce overnight quotas for the areas where standards are exceeded.

INDICATOR - Number of User Created Trails

Actions to be taken if Standards are Exceeded

- De-emphasize attraction of excessively used areas; redirect users to non-wilderness trails.
- Discourage use of user-created trails through public education. Educational messages will notify visitors to spread out when traveling off-trail and to avoid sensitive areas.
- Remove rock cairns in cross country areas.
- Obliterate and restore user-created trails as needed and possible.
- Close sensitive areas to off-trail use where resource damage is persistent.
- Reduce use in areas where other methods are not effective in preventing additional user created trails.

INDICATORS

1. **Ecological condition, and trend**
2. **Utilization**
3. **Soil Disturbance**
4. **Lakeshore and Stream Channel Conditions**
5. **Utilization of Woody Riparian Species**

Actions to be taken if Standards are Exceeded

- Change management practices, including: herding, changing salting locations. No new structural improvements will be built to control use.
- Change the season of use and/or reduce the number of animals.
- Remove livestock from area until resources have recovered and standards are met (resting).

APPENDIX B

TABLE B-1

State of California Air Resources Board Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,4,6]	Method [7]
Ozone	1 hour	0.09 ppm (180 ug/m3)	Ultraviolet photometry	0.12 ppm (235 ug/m3)	Same as Primary Std.	Ethylene Chemiluminescence
Carbon Monoxide	8 hour	9.0 ppm (10 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m3)		Non-dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm 23 mg/m3		35 ppm (40 mg/m3)		
Nitrogen Dioxide	Annual Average	-	Gas Phase Chemilumi-nescence	0.053 ppm (100 ug/m3)	Same as Primary Std.	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 ug/m3)		-		
Sulfur Dioxide	Annual Average	-	Ultraviolet Fluorescence	80 ug/m3 (0.03 ppm)	-	Pararosoaniline
	24 hour	0.04 ppm (105 ug/m3)		365 ug/m3 (0.14 ppm)	-	
	3 hour	-		-	1300 ug/m3 (0.5 ppm)	
	1 hour	0.25 ppm (655 ug/m3)		-	-	
Suspended Particulate Matter (PM 10)	Annual Geometric Mean	30 ug/m3	Size selective Inlet High Volume Sampler and Gravimetric Analysis	-	-	Inertial Separation and Gravimetric Analysis
	24 hour	50 ug/m3		150 ug/m3	Same as Primary Standard	
	Annual Arithmetic Mean	-		50 ug/m3		
Sulfates	24 hour	25 ug/m3	Turbidimetric Barium Sulfate	-	-	-
Lead	30 day Avg.	1.5 ug/m3	Atomic Absorption	-	-	Atomic Absorption
	Calendar Quarter	-		1.5 ug/m3	Same as primary Std.	
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m3)	Cadmium Hyd-roxide STRactan	-	-	-
Vinyl Chloride (chloroethene)	24 hour	0.010ppm (26 ug/m3)	Tedlar Bag Collection, Gas Chromatography	-	-	-
Visibility Reducing Particles [8]	8 hour (10 am to 6 pm, PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 %. Measurement in accordance with ARB Method V.		-	-	-
Applicable Only In The Lake Tahoe Air Basin						
Carbon Monoxide	8 hour	6 ppm (7 mg/m3)	NDIR	-	-	-
Visibility Reducing Particles [9]	8 hour (10 am to 6 pm, PST	In sufficient amount to produce an extinction coefficient of 0.07 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V.		-	-	-

Footnotes on following page

Table A footnotes:

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility reducing particles, are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded.
2. National standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
3. Concentrations expressed first in units which it was promulgated. Equivalent units given in parenthesis are based upon a reference temperature of 25^{o} C and a reference pressure of 760mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25^{o} C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency (EPA).
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.
9. This standard is equivalent to a 30-mile nominal visual range when relative humidity is less than 70 percent.

Table B-2

Elemental Analysis Data for Selected Lichen Species

Note: Lichen analysis data for Meyer Town is provided for comparisons between a site where vehicular traffic is often heavy and a more pristine area, Desolation Wilderness.

Study Site/Species	Phosporous	Sodium	Potassium	Calcium	Magnesium	Zinc	Copper	Iron	Manganese	Boron	Aluminum	Silicon	Titanium
Aloha Lk (1986)													
Letharia ssp	536.94	107.45	3984.67	2431.53	440.73	7.84	2.62	328.33	27.50	2.32	275.47	1314.73	20.47
Bryoria spp	1418.59	93.55	5565.00	1134.80	467.00	7.40	3.64	518.10	34.94	21.68	257.10	940.80	7.22
Echo Area (1988)													
Letharia ssp	2631.67	281.87	2488.33	6281.67	741.50	14.50	3.21	552.00	58.05	7.29	573.30	3246.67	58.53
Bryoria spp	2175.00	153.85	3730.00	2745.00	500.75	19.90	3.94	355.50	37.33	11.67	232.75	1717.50	14.92
Rckbnd Pass (1988)													
Letharia ssp	3835.00	200.50	1650.00	8525.00	1100.00	14.25	3.825	967.50	87.40	8.04	1260.00	4930.00	148.50
Bryoria spp	8150.00	861.25	4600.00	2805.00	1702.50	29.38	20.88	2232.50	144.00	8.91	2780.00	9067.50	263.75
Meyers Town (1986)													
Letharia ssp	- - -	1403.33	6504.44	1375.11	853.44	49.96	7.89	1503.78	90.74	1.275	793.11	3845.56	40.44

Study Site/Species	Vanadium	Cobalt	Nickel	Molybdenum	Chromium	Strontium	Barium	Lithium	Silver	Tin	Lead	Cadmium	Arsenic
Aloha Lk (1986)													
Letharia ssp.	0.808	0.34	1.10	0.09	0.65	12.03	13.65	1.23	0.0067	0.89	6.37	0.56	- - -
Bryoria ssp.	1.38	0.951	2.49	- - -	1.013	6.53	10.49	2.13	0.013	1.784	10.33	- - -	- - -
Echo Area (1988)													
Letharia ssp	1.60	0.09	1.11	0.645	1.39	20.45	18.50	0.00	0.40	0.80	8.49	2.73	0.24
Bryoria spp	0.38	0.005	1.02	0.42	0.625	6.90	12.43	0.00	0.49	0.90	4.88	1.52	0.255
Rckbnd Pass (1988)													
Letharia ssp	2.43	0.26	1.905	0.95	1.825	49.80	30.95	0.00	0.045	0.605	9.915	2.84	0.205
Bryoria spp	4.67	0.82	4.82	2.56	3.79	13.10	46.68	0.068	0.00	1.085	9.57	13.20	0.20
Meyers Town (1986)													
Letharia ssp	1.36	0.60	4.20	0.14	3.86	17.06	27.15	1.10	0.017	1.93	66.88	0.75	- - -

Table B-3

Desolation Wilderness - Visibility Data

The following data are presented in terms of frequency distribution of Standard Visual Range (SVR). For instance, 10% of the usable photographic observations taken in the summer of 1989 had SVR values of 84 kilometers or less.

	Standard Visual Range (kilometers)		
	10%	50%	90%
1988			
Fall	84	186	383
1989			
Winter	-	-	-
Spring	-	-	-
Summer	84	152	271
Fall	70	152	259
1990			
Winter	113	194	285
Spring	52	131	197
Summer	84	146	244
Fall	109	186	359
1991			
Winter	-	-	-
Spring	-	-	-
Summer	84	171	283
Fall	81	155	301
1992			
Winter	-	-	-
Spring	74	131	186
Summer	69	136	249
Fall	57	150	338

Table B-4

Wilderness Lake Study Comparisons for Desolation Wilderness

The following data were compiled from separate studies conducted between 1985 and 1992 in Desolation Wilderness. The 1985 study was part of the Western Lakes Study headed by the Environmental Protection Agency. Data from 1988 for Lake LeConte were collected by the Forest Service and analyzed by Dr. Aaron Brown, then located at the University of California, Riverside. The later two years of data were collected by the Forest Service as part of their inventory and monitoring program of wilderness lakes in Desolation Wilderness and analyzed through cooperation with Dr. John Melak and Dr. Jim Sickman of the University of California, Santa Barbara.

These data have not been collected for enough years to determine any trends in water chemistry in the lakes located in Desolation Wilderness. Therefore, the data presented here provide only an idea of the baseline values to expect at these lakes. Ten to twenty years of monitoring these lakes should provide trend data and should be accompanied with biological data such as zooplankton types and counts.

LAKE	pH units	Spec Cond uS/cm	ANC ueq/l	NH4 uM	Cl ueq/l	NO3 ueq/l	SO4 ueq/l	Ca ueq/l	Mg ueq/l	Na ueq/l	K ueq/l	Secchi Depth meters
FORNI												
1985	6.5	5.7	45.3	0.0	5.6	0.1	4.1	21.0	5.6	30.0	3.4	8.3
1991	6.0	6.0	43.4	0.1	5.9	0.1	3.4	20.7	5.5	26.3	3.0	7.0
1992	6.5	6.5	49.8	0.3	7.4	0.0	3.2	20.5	6.3	32.7	4.1	7.0
LOIS												
1985	6.77	4.2	27.6	0.0	3.3	0.7	8.2	19.0	4.9	10.7	2.5	14.2
1991	5.92	5.3	29.7	0.1	6.2	0.4	10.7	24.8	5.6	12.2	2.3	11.0
1992	6.25	5.1	31.6	0.4	3.1	0.0	11.4	22.4	5.6	13.0	3.0	13.5
DICKS												
1985	6.95	6.1	51.3	0.1	2.5	0.3	7.9	38.2	6.9	13.2	4.5	16.8
1991	6.04	7.1	50.7	0.1	4.3	0.0	10.6	42.2	7.3	14.6	5.3	15.8
1992	6.17	6.5	51.4	0.0	3.8	0.0	10.8	32.4	7.0	15.2	5.5	12.5
WACA												
1985	6.27	2.7	12.9	0.0	3.5	1.5	4.5	10.1	2.5	6.0	2.4	11.6
1991	5.70	3.2	11.8	0.1	3.8	0.0	6.1	11.6	3.0	6.3	1.9	7.8
1992	5.82	2.9	14.1	0.0	3.5	0.1	6.3	10.2	3.0	6.5	2.5	8.8
AZURE												
1985	6.93	4.9	36.8	0.0	4.0	0.8	5.2	25.2	6.2	11.9	3.6	15.2
1991	5.66	6.6	45.4	0.1	4.9	1.8	6.4	32.0	6.6	13.8	4.1	9.8
1992	6.05	5.2	35.2	0.4	4.2	2.0	6.5	25.8	6.6	14.1	4.0	11.5
LeCONTE												
1988	-	-	-	-	0.1	0.1	5.4	12	3.7	2.2	6.3	-
1991	5.80	9.5	22.7	0.1	4.3	0.0	6.3	17.2	3.7	7.7	2.7	9.0
1992	5.88	3.5	19.8	0.0	4.0	0.0	6.2	14.7	3.6	8.2	3.1	10.0
SMITH												
1991	5.99	3.5	25.5	2.2	4.0	0.1	5.5	13.2	3.2	11.1	1.5	
1992	5.92	3.2	21.0	0.0	3.3	0.2	5.3	11.7	3.4	11.8	1.8	17.0
CUP												
1991	6.15	5.2	34.0	0.1	4.4	0.2	6.9	23.3	3.7	15.6	4.5	10.0
1992	5.90	4.8	36.9	0.0	4.3	0.0	7.1	19.8	3.7	17.2	4.7	12.0
SAUCER												
1991	6.09	9.8	77.5	0.1	5.4	0.0	3.5	58.1	9.7	25.5	7.8	7.5
1992	6.48	8.6	93.4	0.0	5.2	0.0	3.6	50.1	9.2	28.0	8.1	5.5
TRIANGLE												
1991	5.93	6.1	47.9	0.1	4.3	0.0	3.2	37.8	6.7	12.1	2.6	4.5
1992	6.22	7.6	56.4	0.1	9.3	0.1	3.1	37.2	7.2	26.2	3.8	3.5

NOTE: Azure and Lois Lakes were stratified during sampling visits each year. Water samples were taken at two depths from these lakes (1 meter from surface and 1 meter from lake bottom, deepest section). Analyses results from each lake were averaged for this report. Actual results are available upon request.

Table D - Glossary of abbreviations:

pH	An increase is a direct measure of acidification.
Spec Cond	Specific Conductivity. Can be related to alkalinity (ANC) and used as a screen tool for identifying waters most sensitive to episodic acidification.
ANC	Acid Neutralizing Capacity. A decrease is a direct measure of acidification.
NH4	Ammonium. This is seldom present in wilderness lakes. An increase suggests elevated nitrogen deposition.
Cl	Chloride is a major anion.
NO3	Nitrate. This is an acid anion most often associated with episodic acidification.
SO4	Sulfate. This is an acid anion often associated with chronic acidification.
Ca	Calcium is a major cation
Mg	Magnesium is a major cation.
Na	Sodium is a major cation.
K	Potassium is a major cation.
Secci Depth	Water Clarity. A decrease indicates loss of transparency, possibly from increase in phytoplankton or organic acids. Increased transparency may indicate acidification.

Table B-5

***De Minimis* Emissions for Conformity Determinations**

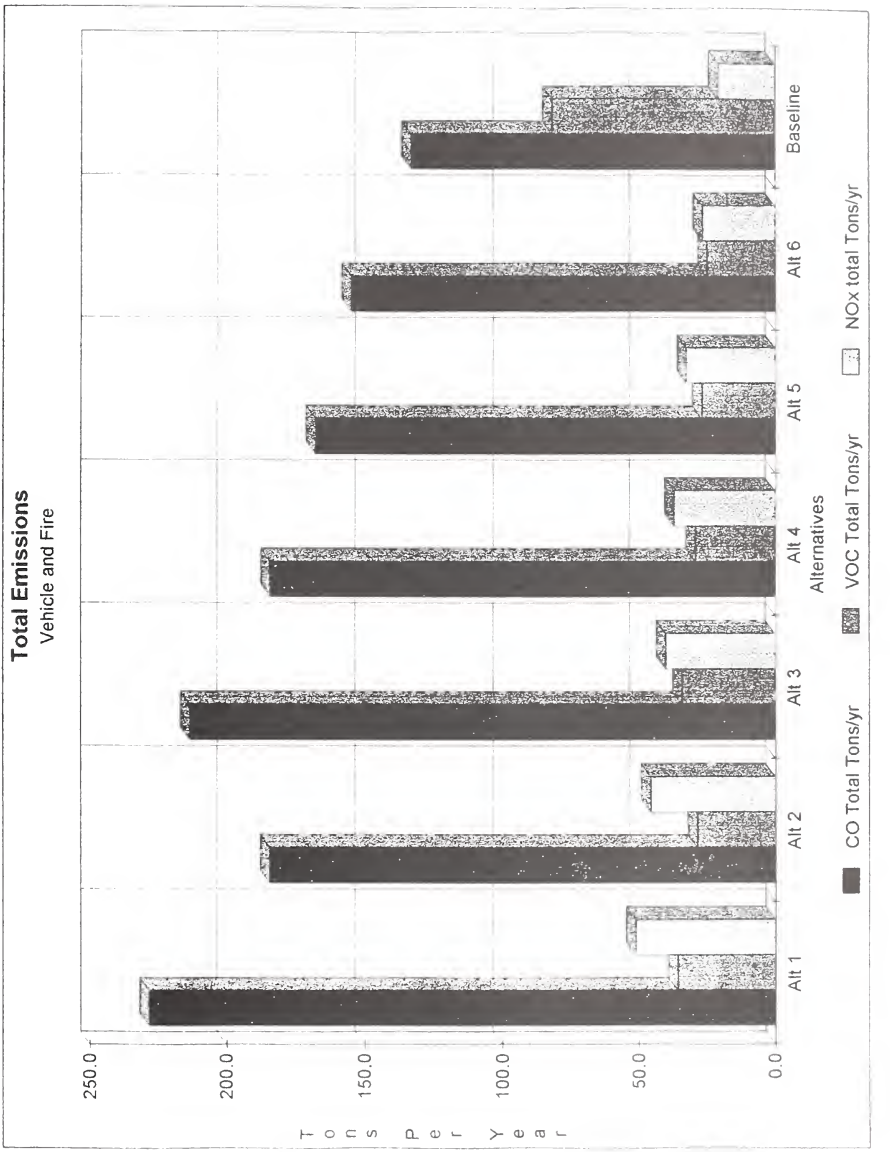
Pollutant	Emissions (tons/year)
Nonattainment Areas	
Ozone (VOCs or NO_X)	
"Serious" Nonattainment Area	50
"Severe" Nonattainment Area	25
"Extreme" Nonattainment Area	10
Other O_3 Nonattainment Area Outside an O_3 Transport Region	100
CO (All Nonattainment Areas)	100
SO_2 or NO_2 (All Nonattainment Areas)	100
PM_{10}	
"Moderate" Nonattainment Area	100
"Serious" Nonattainment Area	70
Pb (All Nonattainment Areas)	25
Maintenance Areas	
Ozone (NO_X Limited), SO_2, NO_2	100
Ozone (VOC Limited)	
Maintenance Area inside Transport Region	50
Maintenance Area outside Transport Region	100
CO	100
PM_{10}	100
Pb	25

TABLE B-6

Total Emissions - Fire and Vehicle

Fire Emissions	**CO Tons/yr**	**VOC Tons/yr**	**NOx Tons/yr**
Alt 1	57.3	9.8	1.6
Alt 2	29.5	5.1	0.8
Alt 3	83.1	14.3	2.4
Alt 4	62.0	10.7	1.8
Alt 5	62.0	10.7	1.8
Alt 6	70.4	12.1	2.0
Baseline	40.4	71.8	1.2
Vehicle Emissions	**CO Tons/yr**	**VOC Tons/yr**	**NOx Tons/yr**
Alt 1	171.06	25.9	49.6
Alt 2	154.77	23.4	44.9
Alt 3	130.33	19.8	37.8
Alt 4	122.2	18.5	35.4
Alt 5	105.9	16.0	30.7
Alt 6	84.7	12.8	24.6
Baseline	92.9	10.3	19.7
Total Emissions	**CO Total Tons/yr**	**VOC Total Tons/yr**	**NOx Total Tons/yr**
Alt 1	228.4	35.7	51.2
Alt 2	184.3	28.5	45.7
Alt 3	213.4	34.1	40.2
Alt 4	184.2	29.2	37.2
Alt 5	167.9	26.7	32.5
Alt 6	155.1	24.9	26.6
Baseline	133.3	82.1	20.9

TABLE B-7


Total Emissions
Vehicle and Fire
250.0
200.0
150.0
100.0
50.0
0.0
Tons Per Year
Alt 1
Alt 2
Alt 3
Alt 4
Alt 5
Alt 6
Baseline
Alternatives
CO Total Tons/yr
VOC Total Tons/yr
NOx total Tons/yr

MAP B-1

TSD-8/94

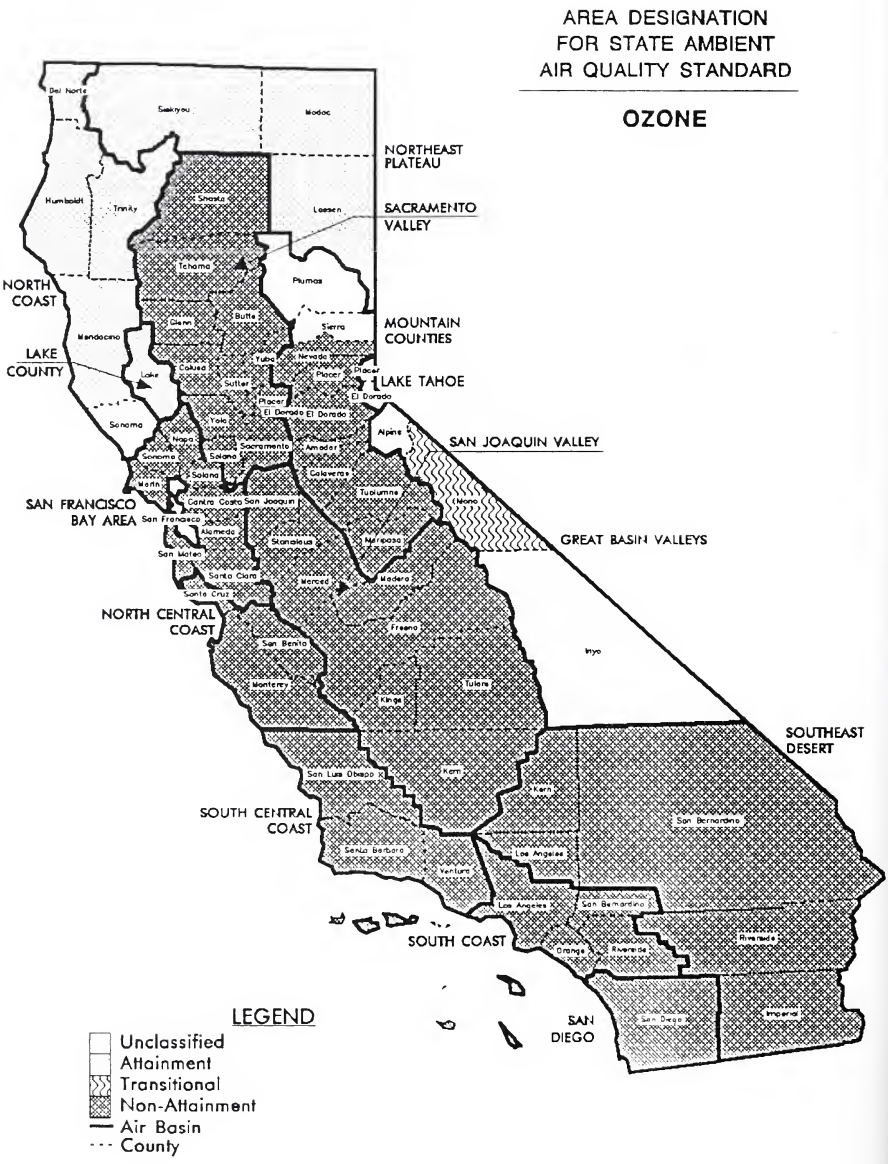
MAP B-2

AREA DESIGNATION
FOR STATE AMBIENT
AIR QUALITY STANDARD

CARBON MONOXIDE

Note: Circular areas denote general location. See Table 2 for area description.

MAP B-3



TSD–8/94

APPENDIX C

List of Lakes in Each Opportunity Class - By Alternative

ALTERNATIVE 1							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
Rockbound Lk	1	Highland Lk	9	Dicks Peak	2		
Genevieve Lk	3	Four Q's lk	10	Middle Mt.	2		
Crag Lk	3	Horseshoe Lk	10	Cliff Lake	2		
Hidden Lk	3	Lwr. Leland	10	Grouse Lks	4		
Rubicon Res	6	Upr.Leland	10	Tells Peak	5		
Fox Lake	6	McConnell Lk	10	Lost Lake	8		
Shadow Lk	7	Phipps Lk	12	Forni Lake	8		
Stny Ridge Lk	7	Snow Lake	24	Mt Price	27		
Rubicon Lk	7	Kalmia Lake	24	Pyramid Peak	27		
Camperflat	11	Tallac Lake	24	Secret Lk	27		
Lake No.5	13	Waca Lake	38	Lake Aloha	27		
Lake No.3	13	Pyramid Lake	38				
Schmidell Lk	14	Cup Lake	45				
Mdl Velma Lk	16	Saucer Lake	45				
Lwr Velma Lk	17	Mt Ralston	45				
Upr Velma Lk	17						
Granite Lk	17						
Azure Lake	17						
Eagle Lake	18						
Top Lake	19						
Lake No. 9	19						
Lawrence Lk	19						
Lois Lake	21						
Clyde Lake	22						
China Flat	22						
Lake Aloha	22						
Dicks Lake	23						
Fontanillis Lk	23						
Maude Lake	25						
Lake Doris	26						
Upr Doris	26						
Half Moon Lk	28						
Alta Morris Lk	28						
Gilmore Lk	29						
Mt. Tallac	29						
Floating Is Lk	30						
Cathedral Lk	30						
Gertrude Lk	31						
Tyler Lake	31						
Umpa Lake	31						
Twin Lakes	32						
Boomerang Lk	32						

ALTERNATIVE 1 (cont.)							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
Island Lk	32						
Le Conte Lk	33						
Heather Lk	33						
Jabu Lake	33						
Lk Lucille	33						
Lk Margery	33						
Lake Aloha	33						
Susie Lake	34						
Grass Lake	35						
Grouse Lk	36						
Hemlock Lk	36						
Smith Lake	37						
American Lk	39						
Channel Lk	39						
Desolation Lk	39						
Chain Lake	39						
Lake Aloha	39						
Lk of the Woods	40						
Frata Lake	40						
Tamarack Lk	41						
Ralston Lake	41						
Cagwin Lake	41						
Triangle Lk	42						
Lost Lake	42						
Lyons Lake	43						
Sylvia Lk	43						
Avalanche Lk	44						
Pitt Lake	44						
Ropi Lake	44						
Osma Lake	44						
Toem Lake	44						
Gefo Lake	44						
Horsetail Falls	44						

ALTERNATIVE 2 (NO ACTION) - EQUIVALENT RATINGS							
OPP CLASS 5	Zone	OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone
Rockbound Lk	1	Crag Lk	3	Rubicon Res	6	Middle Mt.	2
Eagle Lake	18	Genevieve Lk	3	Fox Lake	6	Dicks Peak	2
Grouse Lk	36	Hidden Lk	3	Camper Flat	11	Cliff Lake	2
Hemlock Lk	36	Rubicon Lk	7	Lake No.5	13	Grouse Lakes	4
Frata Lake	40	Shadow Lk	7	Lake No.3	13	Tells Peak	5
Lk of the Woods	40	Stny Ridge Lk	7	Schmidell	14	Lost Lake	8
Ralston Lake	41	Velma Lk, Md	16	Lake No. 9	19	Forni Lake	8
Cagwin Lk	41	Granite Lk	17	Lawrence	19	Highland	9
Tamarack Lk	41	Velma , Lw	17	Top Lake	19	Four Q's Lk	10
Avalanche Lk	44	Velma, Upr	17	Lois Lake	21	Horseshoe Lk	10
Gefo Lake	44	Azure Lake	17	Clyde Lake	22	Lwr. Leland	10
Horsetail Falls	44	Dicks Lake	23	China Flat	22	Upr.Leland	10
Osma Lake	44	Fontanillis	23	Lake Aloha	22	McConnell Lk	10
Pitt Lake	44	Maude Lake	25	Doris Lk	26	Phipps Lk	12
Ropi Lake	44	Alta Morris Lk	28	Doris, Upr	26	Snow Lake	24
Toem Lake	44	Half Moon Lk	28	Gertrude Lk	31	Kalmia Lake	24
		Gilmore Lk	29	Tyler Lake	31	Tallac Lake	24
		Floating Is Lk	30	Umpa Lake	31	Secret Lk	27
		Cathedral Lk	30	Smith Lake	37	Mt. Price	27
		Boomerang Lk	32	Waca Lake	38	Lk Aloha	27
		Island Lk	32	Pyramid Lake	38	Pyramid Peak	27
		Twin Lakes	32	Cup Lake	45		
		Lake Aloha	33	Saucer Lake	45		
		Heather Lk	33	Mt Ralston	45		
		Jabu Lake	33				
		Lk Le Conte	33				
		Lucille Lk	33				
		Margery Lk	33				
		Susie Lake	34				
		Grass Lake	35				
		American Lk	39				
		Channel Lk	39				
		Desolation Lk	39				
		Chain Lake	39				
		Lake Aloha	39				
		Triangle Lake	42				
		Lost Lk (LTB)	42				
		Lyons Lake	43				
		Sylvia Lk	43				

ALTERNATIVE 3							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
Rockbound Lk	1	Crag Lk	3	Grouse Lakes	4	Cliff Lake	2
Eagle Lake	18	Genevieve Lk	3	Rubicon Res	6	Middle Mt.	2
Lake No. 9	19	Hidden Lk	3	Fox Lake	6	Dicks Peak	2
Lawrence Lk	19	Rubicon Lk	7	Lost Lake	8	Tells Peak	5
Top Lake	19	Shadow Lk	7	Forni Lake	8	Lk Aloha	27
Floating Is Lk	30	Stny Ridge Lk	7	Highland Lk	9	Mt. Price	27
Cathedral Lk	30	Schmidell Lk	14	Four Q's Lk	10	Secret Lk	27
Grass Lake	35	Velma, Mdl	16	Horseshoe Lk	10	Pyramid Peak	31
Grouse Lk	36	Granite Lk	17	Lwr. Leland	10		
Hemlock Lk	36	Velma, Lwr	17	Upr.Leland	10		
Lake o Woods	40	Velma, Upr	17	McConnell Lk	10		
Tamarack Lk	41	Azure Lake	17	Camper Flat	11		
Ralston Lake	41	Lois Lake	21	Phipps Lk	12		
Cagwin Lk	41	Dicks Lake	23	Lake No.5	13		
Avalanche Lk	44	Fontanillis L	23	Lake No.3	13		
Gefo Lake	44	Maude Lake	25	Clyde Lake	22		
Horsetail Fls	44	Doris Lk	26	China Flat	22		
Osma Lake	44	Alta Morris Lk	28	Lake Aloha	22		
Pitt Lake	44	Half Moon Lk	28	Snow Lake	24		
Ropi Lake	44	Gilmore Lk	29	Kalmia Lake	24		
Toem Lake	44	Mt. Tallac	29	Tallac Lake	24		
		Boomerang L	32	Gertrude Lk	31		
		Island Lk	32	Tyler Lake	31		
		Twin Lakes	32	Umpa Lake	31		
		Lake Aloha	33	Smith Lake	37		
		Heather Lk	33	Cup Lake	45		
		Jabu Lake	33	Saucer Lake	45		
		Lk Le Conte	33	Mt. Ralston	45		
		Lucille Lk	33				
		Margery Lk	33				
		Susie Lake	34				
		Pyramid Lake	38				
		Waca Lake	38				
		American Lk	39				
		Channel Lk	39				
		Desolation Lk	39				
		Chain Lake	39				
		Lake Aloha	39				
		Frata Lake	40				
		Triangle Lake	42				
		Lost Lk (LTB)	42				
		Lyons Lake	43				
		Sylvia Lk	43				

ALTERNATIVE 4							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
Eagle Lake	18	Rockbound Lk	1	Rubicon Res	6	Cliff Lake	2
Tamarack Lk	41	Genevieve Lk	3	Fox Lake	6	Middle Mt.	2
Ralston Lake	41	Crag Lk	3	Highland Lk	9	Dicks Peak	2
Cagwin Lake	41	Hidden Lk	3	Four Q's	10	Grouse Lks	4
Avalanche Lk	44	Shadow Lk	7	Horseshoe Lk	10	Tells Peak	5
Pitt Lake	44	Stny Ridge Lk	7	Lwr. Leland	10	Lost Lake	8
Ropi Lake	44	Rubicon Lk	7	Upr.Leland	10	Forni Lake	8
Osma Lake	44	Mdl Velma	16	McConnell Lk	10	Lake Aloha	27
Toem Lake	44	Lwr Velma	17	Camper Flat	11	Mt. Price	27
Gefo Lake	44	Upr Velma	17	Phipps Lk	12	Secret Lk	27
Horsetail Fls	44	Granite Lk	17	Lake No.5	13	Pyramid Peak	27
		Azure Lake	17	Lake No.3	13	Cup Lake	45
		Maude Lake	25	Schmidell Lk	14	Saucer Lake	45
		Lake Doris	26	Top Lake	19	Mt. Ralston	45
		Upr Doris	26	Lake No. 9	19		
		Gilmore Lk	29	Lawrence Lk	19		
		Mt. Tallac	29	Lois Lake	21		
		Cathedral Lk	30	Clyde Lake	22		
		Floating Is L	30	China Flat	22		
		Twin Lakes	32	Lake Aloha	22		
		Boomerang L	32	Dicks Lake	23		
		Island Lk	32	Fontanillis Lk	23		
		Lk Le Conte	33	Snow Lake	24		
		Heather Lk	33	Kalmia Lake	24		
		Jabu Lake	33	Tallac Lake	24		
		Lk Lucille	33	Half Moon Lk	28		
		Lk Margery	33	Alta Morris Lk	28		
		Lake Aloha	33	Gertrude Lk	31		
		Susie Lake	34	Tyler Lake	31		
		Grass Lake	35	Umpa Lake	31		
		Grouse Lk	36	Smith Lake	37		
		Hemlock Lk	36	Pyramid Lake	38		
		Lk o/t Woods	40	Waca Lake	38		
		Frata Lake	40	American Lk	39		
		Triangle Lk	42	Channel Lk	39		
		Lost Lake	42	Desolation Lk	39		
		Lyons Lake	43	Chain Lake	39		
		Sylvia Lk	43	Lake Aloha	39		

ALTERNATIVE 5							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
Eagle Lake	18	Rockbound Lk	1	Rubicon Res	6	Cliff Lake	2
Tamarack Lk	41	Genevieve Lk	3	Fox Lake	6	Middle Mt.	2
Ralston Lake	41	Crag Lk	3	Shadow Lk	7	Dicks Peak	2
Cagwin Lake	41	Hidden Lk	3	Stny Ridge Lk	7	Grouse Lks	4
		Maude Lake	25	Rubicon Lk	7	Tells Peak	5
		Lake Doris	26	Camper Flat	11	Lost Lake	8
		Upr Doris	26	Phipps Lk	12	Forni Lake	8
		Gilmore Lk	29	Lake No.5	13	Highland Lk	9
		Mt. Tallac	29	Lake No.3	13	Four Q's	10
		Cathedral Lk	30	Schmidell Lk	14	Horseshoe Lk	10
		Floating Is L	30	Mdl Velma	16	Lwr. Leland	10
		Twin Lakes	32	Lwr Velma	17	Upr.Leland	10
		Boomerang L	32	Upr Velma	17	McConnell Lk	10
		Island Lk	32	Granite Lk	17	Snow Lake	24
		Susie Lake	34	Azure Lake	17	Kalmia Lake	24
		Grass Lake	35	Top Lake	19	Tallac Lake	24
		Grouse Lk	36	Lake No. 9	19	Lake Aloha	27
		Hemlock Lk	36	Lawrence Lk	19	Mt. Price	27
		Avalanche Lk	44	Lois Lake	21	Secret Lk	27
		Pitt Lake	44	Clyde Lake	22	Pyramid Peak	27
		Ropi Lake	44	China Flat	22	Cup Lake	45
		Osma Lake	44	Lake Aloha	22	Saucer Lake	45
		Toem Lake	44	Dicks Lake	23	Mt. Ralston	45
		Gefo Lake	44	Fontanillis Lk	23		
		Horsetail Falls	44	Half Moon Lk	28		
				Alta Morris Lk	28		
				Gertrude Lk	31		
				Tyler Lake	31		
				Umpa Lake	31		
				Lk Le Conte	33		
				Heather Lk	33		
				Jabu Lake	33		
				Lk Lucille	33		
				Lk Margery	33		
				Lake Aloha	33		
				Smith Lake	37		
				Pyramid Lake	38		
				Waca Lake	38		
				American Lk	39		
				Channel Lk	39		
				Desolation Lk	39		

ALTERNATIVE 5 (cont.)							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
				Chain Lake	39		
				Lake Aloha	39		
				Lk of the Woods	40		
				Frata Lake	40		
				Triangle Lk	42		
				Lost Lake	42		
				Lyons Lake	43		
				Sylvia Lk	43		

ALTERNATIVE 6							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
				Rockbound Lk	1	Cliff Lake	2
				Genevieve Lk	3	Middle Mt.	2
				Crag Lk	3	Dicks Peak	2
				Hidden Lk	3	Grouse Lks	4
				Eagle Lake	18	Tells Peak	5
				Top Lake	19	Rubicon Res	6
				Lake No. 9	19	Fox Lake	6
				Lawrence Lk	19	Shadow	7
				Maude Lake	25	Stony Ridge Lk	7
				Gilmore Lk	29	Rubicon Lk	7
				Mt. Tallac	29	Lost Lake	8
				Floating Is Lk	30	Forni Lake	8
				Cathedral Lk	30	Highland	9
				Gertrude Lk	31	Four Q's	10
				Tyler Lake	31	Horseshoe	10
				Umpa Lake	31	Lwr. Leland	10
				Twin Lakes	32	Upr.Leland	10
				Boomerang Lk	32	McConnell	10
				Island Lk	32	Camper Flat	11
				Grass Lake	35	Phipps Lk	12
				Grouse Lk	36	Lake No.5	13
				Hemlock Lk	36	Lake No.3	13
				Tamarack Lk	41	Schmidell	14
				Ralston Lake	41	Mdl Velma	16
				Cagwin Lake	41	Azure Lake	17
				Lyons Lake	43	Lwr Velma	17
				Sylvia Lk	43	Upr Velma	17
				Avalanche Lk	44	Granite Lk	17
				Pitt Lake	44	Lois Lake	21
				Ropi Lake	44	Clyde Lake	22
				Osma Lake	44	China Flat	22
				Toem Lake	44	Lake Aloha	22
				Gefo Lake	44	Dicks Lake	23
				Horsetail Falls	44	Fontanillis L	23
						Snow Lake	24
						Kalmia Lake	24
						Tallac Lake	24
						Lake Doris	26
						Upr Doris	26
						Lake Aloha	27
						Mt. Price	27
						Pyramid Peak	27

ALTERNATIVE 6 (cont.)							
OPP CLASS 4	Zone	OPP CLASS 3	Zone	OPP CLASS 2	Zone	OPP CLASS 1	Zone
						Secret Lk	27
						Half Moon Lk	28
						Alta Morris Lk	28
						Lk Le Conte	33
						Heather Lk	33
						Jabu Lake	33
						Lk Lucille	33
						Lk Margery	33
						Lake Aloha	33
						Susie Lake	34
						Smith Lake	37
						Waca Lake	38
						Pyramid Lk	38
						American Lk	39
						Channel Lk	39
						Desolation Lk	39
						Chain Lake	39
						Lake Aloha	39
						Lk o/t Woods	40
						Frata Lake	40
						Triangle Lk	42
						Lost Lk (LTB)	42
						Cup Lake	45
						Saucer Lake	45
						Mt. Ralston	45

APPENDIX D

CURRENT FISH STOCKING PRACTICES - BY LAKE

Lake Name	Location USGS Quad	For-est	Lake Acres	Lake Depth(ft)	R. Muscosa Present	Sp Stocked Pre-Wild	Bk Reprod	Other spawning	Stocking practices	Stocked Species
4 Qs Lake - Lower	Rockbound	ENF	2.4	16	unknown	BK,RT*	yes?	no	Y	BK
4 Qs Lake - Middle	Rockbound	ENF	2.8	19	unknown	BK,RT*	yes?	no	Y	BK
4 Qs Lake - Upper	Rockbound	ENF	6	21	unknown	BK*	yes?	no	Y	BK
Lake Aloha	Pyramid	ENF	610	30 est	unknown	BK,RT*	yes?	no	Y	BK
Alta Morris Lake	Rockbound	LTB	4.3	18	unknown	BK,GT	yes	no	N - SS	BK
American Lake	Pyramid	ENF	10.7	40	unknown	BK,RT*	yes	no	N - SS	BK
Avalanche Lake	Echo	ENF	1.7	<20	yes	BK	yes?	yes	Y	RT
Azure Lake	Emrld Bay	LTB	30.5	103	unknown	BK,RT	yes?	no	N - SS	BK
Boomerang Lake	Rockbound	ELD	0.8	<10	yes		no	no	NMFT	
Cagwin Lake	Echo	LTB	2.2	12	unknown	RT	no	yes	Y	RT
Cathedral Lake	Emrld Bay	LTB	1.8	?	unknown	BK,GT	yes?	no	Y	GT
Channel Lake	Pyramid	ENF	3.7	16	yes	BK,RT	yes/94	no	Y	BK
Cliff Lake	Rockbound	LTB	4.2	<20	unknown	BK,GT*	yes/94	no	N - SS	BK
Clyde Lake	Rockbound	ENF	21.5	35	unknown	BK,GT	no	?	Y	GT
Crag Lake	Rockbound	LTB	22	?	unknown	BK,BN*	yes/94	no	Y	BK
Cup Lake	Echo	ENF	2.5	?	unknown	BK,GT	yes/67	no	Y	GT
Desolation Lake	Echo	ENF	3.6	13	yes	BK,RT*	no	yes-RT	Y	BK
Dicks Lake	Rockbound	LTB	61.2	65	unknown	BK,RT	yes/94	yes-RT	N - SS	BK, RT
Doris Lake - Lower	Rockbound	ENF	2.4	12	yes	GT	yes/93	yes	Y	GT
Doris Lake - Upper	Rockbound	ENF	0.6	18	yes	GT	no	yes	Y	GT
Eagle Lake	Emrld Bay	LTB	19.9	25 est	unknown	RT	yes/86	no	Y	RT
Floating Island Lk.	Emrld Bay	LTB	1.8	?	unknown	BK	yes/94	no	Y	BK
Fontanillis Lake	Rockbound	LTB	25.1	76	unknown	BK	yes/94	y-RT/94	N - SS	BK
Forni Lake	Loon	ENF	5.6	>27	unknown	BK,GT	yes/65	no	Y	GT
Fox Lake	Rockbound	ENF	3.6	<20 est.	unknown	BK,RT*	yes/93	no	Y	BK
Frata Lake	Echo	ENF	1.9	10	yes	BK,RT*	yes/86	no	Y	BK
Gefo Lake	Pyramid	ENF	3.7	9	yes	BK	yes	no	Y	BK
Genevieve Lake	Rockbound	LTB	6.9	?	unknown	Bk, BN*	yes?	y-BN/67	Y	BK
Gertrude	Rockbound	ENF	2.4	11	yes	BK,GT	yes?	no	Y	GT
Gilmore Lake	Emrld Bay	LTB	78.7	250	unknown	RT	yes	y-LT	Y	RT, LT

CURRENT FISH STOCKING PRACTICES - BY LAKE

Lake Name	Location USGS Quad	For-est	Lake Acres	Lake Depth(ft)	R. Muscosa Present	Sp Stocked Pre-Wild	Bk Reprod	Other spawning	Stocking practices	Stocked Species
Granite Lake	Emrld Bay	LTB	8.2	?	unknown	BK	yes?	no	Y	BK
Grass Lake	Echo	LTB	17.7	?	unknown	BK,RT	yes?	no	Y	BK, RT
Grouse Lake	Pyramid	ENF	3.8	<20 est.	unknown	RT	yes?	yes	Y	RT
Grouse Lks - Lwr	Rockbound	LTB	2.2	?	yes	BK,RT*	yes?	no	Y	BK
Grouse Lks - Upr	Rockbound	LTB	0.8	?	yes	BK,RT*	yes?	no	Y	BK
Half Moon Lake	Rockbound	LTB	23.4	19	unknown	BK,RT	yes	no	N - SS	BK
Heather Lake	Rockbound	LTB	34.4	>50	unknown	RT,BN*	yes	y-BN/84	N - SS	BK
Hemlock Lake	Pyramid	ENF	1.2	14	yes	BK	yes?	no	Y	BK
Hidden Lake	Rockbound	LTB	5.6	?	unknown	BK,RT*	yes?	no	Y	RT
Highland Lake	Rockbound	ENF	13.3	88	yes	RT	no	yes	Y	RT
Horseshoe Lake	Rockbound	ENF	8.4	10	unknown	RT	yes?	no	Y	BK
Island Lake	Rockbound	ENF	20.2	?	yes	BK	yes	y-RT/94	N - SS	BK
Jabu Lake	Echo	LTB	1.4	>20 est.	unknown	BK*,GT	no	?	Y	GT
Kalmia Lake	Emrld Bay	LTB	3.8	15	unknown	GT	no	no	Y	GT
Lawrence Lake	Rockbound	ENF	8.1	>35 est.	unknown	BK,RT*	yes?	no	Y	BK, RT
LeConte Lake	Pyramid	LTB	5.5	35 est.	unknown	BK*,RT	yes?	no	Y	BK, RT
Leland Lake - Lwr	Rockbound	ENF	5.2	32	yes	GT	no	yes/85	Y	GT
Leland Lake - Upr	Rockbound	ENF	3.8	13	yes	GT	no	yes/85	NMFT	
Lake of the Woods	Echo	ENF	69.4	70	yes	BK,RT	yes?	no	Y	BK, RT
Lois Lake	Rockbound	ENF	23.3	73	yes	BK	yes	no	N - SS	BK
Lost Lake	Echo	LTB	1.8	?	unknown	BK,RT*,GT	yes?	no	Y	GT
Lost (Gem) Lake	Rockbound	ENF	3.1		yes	BK	yes?	no	Y	BK
Lucille Lake	Echo	LTB	7.9	<20 est.	unknown	BK	yes	no	N - SS	BK
Lyons Lake	Pyramid	ENF	7.2	?	unknown	RT	yes/93	no	Y	BK
Margery Lake	Echo	ENF	4.5	<20	unknown	BK,RT*	yes/93	no	Y	BK
Maude Lake	Rockbound	ENF	6.9	<20	unknown	RT,	no	y-BN/93	Y	RT
McConnell Lake	Rockbound	ENF	5.3	8 est.	yes		no	yes-GT	NMFT	GT migrants
Lake # 3	Rockbound	ENF	6.6	25 est.	unknown	BK*,GT	yes?	yes	Y	GT
Lake # 5	Rockbound	ENF	3.5	8 est.	unknown	BK,RT*	yes/93	no	Y	BK

CURRENT FISH STOCKING PRACTICES - BY LAKE

Lake Name	Location USGS Quad	For-est	Lake Acres	Lake Depth(ft)	R. Muscosa Present	Sp Stocked Pre-Wild	Bk Reprod	Other spawning	Stocking practices	Stocked Species
Lake # 9	Rockbound	ENF	1.7	9	yes	BK*	no	no	NMFT	
Osma Lake	Pyramid	ENF	1	11	unknown	RT*	no	no	NMFT	
Phipps Lake	Rockbound	ENF	10.1		unknown	BK,GT	yes/87	no	N - SS	BK
Pitt Lake	Echo	ENF	1.8	8	yes		yes	no	NMFT	BK migrants
Pyramid Lake	Pyramid	ENF	8.5	>20	yes	BK,RT*	yes	no	Y	BK
Ralston Lake	Echo	LTB	12	35	unknown	BK,RT	yes	no	Y	BK, RT
Rockbound Lake	Rockbound	ENF	117	95	unknown	BK,RT	yes	y-BN/89	Y	RT
Ropi Lake	Pyramid	ENF	17.8	50 est.	unknown	BK,RT*	yes?	no	Y	BK, RT
Rubicon Lake	Rockbound	LTB	7.9	30 est	unknown	BK,RT	yes	y-RT/94	N - SS	BK
Rubicon Res.	Rockbound	ENF	80	30 est.	unknown	RT	?	?	Y	RT
Saucer Lake	Echo	LTB	1.1	?	unknown	BK,GT	?	no	Y	GT
Lake Schmidell	Rockbound	ENF	36	>100	unknown	BK	yes	no	N - SS	BK
Secret Lake	Pyramid	ENF	1.2	?	unknown		yes	no	Y (NSP)	BK
Shadow Lake	Rockbound	LTB	5.8	?	unknown	BK,RT*	yes?	y-BN/81	Y	BK
Smith Lake	Pyramid	ENF	9	>50 est.	yes	BK	yes	no	N - SS	BK
Snow Lake	Emrld Bay	LTB	14.5	>20 est.	unknown	BK	yes	no	Y	BK
Stoney Ridge Lake	Rockbound	LTB	53	>20	unknown	BK	yes?	y-LT/84	Y	BK, LT
Susie Lake	Rockbound	LTB	37	68	unknown	RT	yes?	y-RT/94	N - SS	BK, RT
Lake Sylvia	Pyramid	ENF	2.8	<20 est.	unknown	BK	yes?	no	Y	BK
Tallac Lake	Emrld Bay	LTB	1.1	?	unknown	GT	no	yes	Y	GT
Tamarack Lake	Echo	LTB	23	31	yes	BK,RT*	yes?	no	Y	BK
Toem Lake	Pyramid	ENF	9	?	unknown	BK,RT	yes?	no	Y	RT
Top Lake	Rockbound	ENF	5.2	20 est.	yes	BK,GT	yes?	yes	Y	GT
Triangle Lake	Echo	LTB	1.1	?	unknown	BK,RT	no	no	Y	RT
Twin Lakes - Lwr	Pyramid	ENF	9.1	?	yes	BK,RT	yes?	no	Y	RT
Twin Lakes - Upr	Pyramid	ENF	12.7	?	yes	BK	yes?	no	Y	RT
Tyler Lake	Rockbound	ENF	2.2	20 est.	unknown	BK	yes	yes	Y	BK
Velma Lake - Lwr	Rockbound	LTB	34	61	unknown	RT	yes	y-RT/94	N - SS	BK, RT
Velma Lake - Mid	Rockbound	ENF	43	44	unknown	RT	no	no	Y	RT

CURRENT FISH STOCKING PRACTICES - BY LAKE

Lake Name	Location USGS Quad	For-est	Lake Acres	Lake Depth (ft)	R. Muscosa Present	Sp Stocked Pre-Wild	Bk Reprod	Other spawning	Stocking practices	Stocked Species
Velma Lake - Upr	Rockbound	LTB	14.4	29	unknown	RT	yes	y-RT/94	N - SS	BK, RT
Waca Lake	Pyramid	ENF	4.7	>38	yes	BK	yes?	no	Y	BK
Lake Zitella	Rockbound	ENF	7.5	15	yes	RT	no	no	NMFT	
Unnamed Lake-936	Loon	ENF	2.9	?	unknown	BK	yes?	no	Y	BK
Unnamed Lake -BP.	Rockbound	ENF	2.3	12	unknown		?	no	Y - NSP	RT
Unnamed Lake -D.	Rockbound	LTB	1.3	?	unknown	BK,RT*	yes?	no	Y	BK
Unnamed Lk #1-G	Rockbound	ENF	1	?	unknown		yes?	no	Y-NSP	BK
Unnamed Lk #2-G	Rockbound	ENF	1.2	?	unknown		yes?	no	Y-NSP	BK
Unnamed Lk #1-F	Rockbound	LTB	4.6	20	unknown	BK*	yes	no	N - SS	BK
Unnamed Lk #2-F	Rockbound	LTB	2.8	20	unknown	BK	yes	no	N - SS	BK
Unnamed Lake - E	Rockbound	LTB	2.4	20 est.	yes	BK,GT	yes	no	N - SS	BK
Unnamed Lake - H	Loon	ENF	2.4	?	unknown	BK, CT	yes	no	N - SS	BK
Unnamed Lake - J	Loon	ENF	0.8	?	unknown		yes?	no	Y -NSP	BK, RT
Unnamed Lk - L	Rockbound	ENF	2.2	?	unknown	BK	no	no	NMFT	
Unnamed Lake - M	Rockbound	ENF	1.1	?	unknown		no	no	Y-NSP	RT
Unamed Lake - P	Echo	ENF	2.5	20	yes?	GT	no	no	Y	GT
Total acres of lakes, etc									1863.8	
Acres of lakes stocked									1433.9	
Acres of lakes Self-sust									405.8	
Acres of lakes without fish									24.1	
Total # of Lakes									104	
# of lakes stocked									74	
# lakes Self-sust									22	
# lakes without fish									8	

Key: Current Fish Stocking Practices - by Lake

NOTE: The information for this table was compiled from limited CDFG/USFS surveys in 1993, 1994 and 1995, and from CDFG and USFS files and planting records.

Abbreviations:

BK - Eastern Brook Trout
RT - Rainbow Trout
GT - Golden Trout
BN - German Brown Trout
CT - Rainbow/Cutthroat hybrid
LT - Lake Trout (Mackinaw)

Abbreviations for Stocking Practices:

"Y" - stocked lakes
"N-SS" - lakes managed as self-sustaining fisheries, not currently stocked, may be stocked if angling pressure affects population.
NMFT - not managed for trout, not stocked.
(NSP) - Lake first stocked after wilderness designation

Column Titles:

Lake Name - This list includes those lakes which have been stocked, or which are known to have fish due to instream migration from stocked lakes. Within the Desolation, CDFG only stocks lakes.

Location -This column provides the name of the USGS Quad in which the lake is located.

Forest - ENF - the area is administered by the Eldorado NF, LTB - the area is administered by the Lake Tahoe Basin Management Unit.

Lake Acres -The surface acres of the lake - this information was taken, in most cases, from a computer generated map of the Wilderness.

Lake Depth -Depth information was compiled, in most cases, from CDFG lakes records. Lake depth can influence whether a lake will be subject to"winterkill" of the lake's fish population.

R. Muscosa - This column indicates whether Mountain yellow-legged frogs (Rana muscosa) are (or have been) present.

yes = presence recently documented in lakes. Data is taken from CDFG/USFS surveys conducted in 1993/1994.

yes-A = presence recently documented in area immediately adjacent to the lake.

yes ? = presence recently reported, but not documented.

yes-H = presence historically documented in CDFG lake surveys during 1950's.

Species Stocked Pre-wilderness -This column provides the species of fish which were stocked in the lake before wilderness designation. An "*" denotes those species which were stocked only several times in that water. If the column is blank, the lake was first stocked after wilderness designation.

BK Reproduction -Yes - reproduction is verified; Yes? - reproduction is assumed, due to BK presence, but it has not been verified.

Other Spawning -A yes in this column indicates that species other than BK are reproducing in the lake or associated streams. In some cases, the species and year of noted spawning are included. There are no records of stocking for some species shown in this column, however the species is present and self-sustaining.

Stocking practices - This column reflects CDFG stocking practices as of June, 1995. Communications with CDFG in 1995 indicate that lakes which were first stocked after wilderness designation will not be stocked after 1995.

Species stocked - This column indicates the fish species being stocked as of June 1995. For those waters which are not stocked, the column shows the species which are present due to self-.

APPENDIX E

Table E-1 Zone Overnight and Day Use Quota Information by Alternative

		Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5				Alternative 6			
Trailhead	Proposed Zones	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Day Use Quota - None	78 Zone Capacity (persons)	Current Overnight Quota (persons)	93 Avg # Day Permits (Wkend Day)*	93 High # Day Permits (Wkend Day)*	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)
Loon (1)	001(Rckbd Lk)	4	15	25	..	29		..		4	15	25		3	4	25		3	4	25		2	2	13	
	005 (Huth Lk)	2	2	0	..	2		..		1	.5	0		1	.5	0		1	.5	0		1	.5	0	
	006 (Rub. Res)	4	15	22	..	10		..		2	2	19		2	2	19		2	2	19		1	.5	10	
	011 Cmpr Flt	4	15	2	..	2		..		2	2	1		2	2	1		2	2	1		1	.5	1	
TOTAL				49		43	38	4	16			45	7			45	5			45	4			24	2
Van Vleck (2)	005 (Huth Lk)	2	2	4	..	3		..		1	.5	2		1	.5	2		1	.5	2		1	.5	2	
	008 (Tells)	2	2	11	..	4		..		2	2	11		1	.5	8		1	.5	8		1	.5	8	
	009 (Highland)	3	4	8	..	25		..		2	2	8		2	2	8		1	.5	3		1	.5	3	
	013 Lk #3,5	4	15	8	..	18		..		2	2	6		2	2	6		2	2	6		1	.5	2	
TOTAL				31		50	24	4	5			27	7			24	4			19	4			15	3
Barrett (3A)	010 4Qs-Leland	3	4	22	..	68		..		2	2	19		2	2	19		1	.5	11		1	.5	11	
	013 Lk #3, #5	4	15	2	..	8		..		2	2	2		2	2	2		2	2	2		1	.5	0	
	019 Lawrence	4	15	13	..	37		..		4	15	13		2	2	6		2	2	6		2	2	6	
	020 Rckbd Pass	3	4	8	..	2		..		2	2	8		1	.5	2		1	.5	2		1	.5	2	
TOTAL				45		115	45	4	6			42	13			29	8			21	7			19	6
Rockbound (3B)	011 Cmpr Flt	4	15	20	..	17		..		2	2	14		2	2	14		2	2	14		1	.5	8	
	014 Schmidell	4	15	12	..	32		..		3	4	10		2	2	8		2	2	8		1	.5	3	
	021 Lois	4	15	8	..	11		..		3	4	6		2	2	4		2	2	4		1	.5	2	
	022 China Flt	4	15	20	..	10		..		2	2	12		2	2	12		2	2	12		1	.5	10	
	025 Maud Lk	4	15	18	..	13		..		3	4	12		3	4	12		2	2	9		2	2	9	
	026 Lk Doris	4	15	8	..	7		..		3	4	5		3	4	5		2	2	4		1	.5	2	
	031 Tyler	4	15	10	..	10		..		2	2	6		2	2	6		2	2	6		2	2	6	
TOTAL				96		100	50	6	14			65	12			61	7			57	6			40	3
Twin Lks (3C)	032 Twin Lks	4	15	26	..	10		..		3	4	12		3	4	10		3	4	10		2	2	8	
	036 Hemlock Lk	4	15	8	..	2		..		4	15	8		3	4	2		3	4	2		2	2	2	
	037 Smith Lk	4	15	10	..	3		..		2	2	2		2	2	2		2	2	2		1	.5	1	
TOTAL				44		15	39	25	46			22	25			14	15			14	15			11	10
Lyons Cr. (4)	027 Mt Price	2	2	8	..	5		..		1	.5	7		1	.5	7		1	.5	7		1	.5	7	
	043 Lyons	4	15	22	..	12		..		3	4	17		3	4	17		2	2	13		2	2	13	
TOTAL				30		17	25	8	16			24	13			24	8			20	5			20	3

* includes an estimated 25% non-compliance rate.

Trailhead	Proposed Zones	Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5				Alternative 6			
		Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Day Use Quota - None	78 Zone Capacity (persons)	Current Overnight Quota (persons)	93 Avg # Day Permits (Wkend Day)*	93 High # Day Permits (Wkend Day)*	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)
Twin Bridges(5)	033 Aloha/Jab	4	15	3	..	4		...		3	4	2		3	4	2		2	2	0		1	.5	0	
	038 Waca Lk	3	4	8	..	6		...		3	4	8		2	2	3		2	2	3		1	.5	2	
	039 American	4	15	16	..	2		...		3	4	12		2	2	8		2	2	8		1	.5	6	
	040 LOTW	4	15	9	..	15		...		4	15	9		3	4	6		2	2	5		1	.5	3	
	044 Avalanche	4	15	20	..	4		...		4	15	15		4	15	15		3	4	8		2	2	6	
TOTAL				53		27	22	33	80			44	28			32	20			24	13			17	3
Ralston (6)	045 Ralston	3	4	5	..	0		...		2	2	5		1	.5	4		1	.5	4		1	.5	4	
TOTAL				5		0	10	4	6			5	4			4	3			4	3			4	3
Echo (7)	033 Aloha/Jab	4	15	48	..	18		...		3	4	26		3	4	26		2	2	16		1	.5	13	
	040 LOTW	4	15	28	..	30		...		4	15	28		3	4	20		2	2	9		1	.5	5	
	041 Tamarack	4	15	15	..	12		...		4	15	0		4	15	0		3	4	0		2	2	0	
	042 Triangle	4	15	8	..	3		...		3	4	8		3	4	8		2	2	2		1	.5	2	
TOTAL				99		63	70	31	50			62	28			54	22			27	18			20	12
Glen Alpine (8)	015 Dicks Pk.	2	2	4	..	2		...		1	.5	2		1	.5	2		1	.5	2		1	.5	2	
	033 Aloha/Jab	4	15	10	..	15	2	...		3	4	8		3	4	8		2	2	5		1	.5	2	
	028 1/2 Moon	4	15	12	..	10		...		3	4	7		2	2	2		2	2	2		1	.5	2	
	029 Gilmore	4	15	12	..	10		...		3	4	8		3	4	8		3	4	6		2	2	4	
	034 Susie	4	15	12	..	9		...		3	4	8		3	4	8		3	4	8		1	.5	2	
	035 Grass Lk	4	15	10	.	2		...		4	15	10		3	4	8		3	4	8		2	2	2	
TOTAL				60		48	42	45	68			43	28			36	28			31	20			14	12
Fallen Leaf (9)	030 Cathedral	4	15	12	.	2		..		4	15	12		3	4	1		3	4	1		2	2	1	
	029 Gilmore	4	15	7	.	2		..		3	4	5		3	4	5		3	4	4		2	2	2	
TOTAL				19		4	38	4	5			17	5			6	4			5	4			3	2
Mt.Tallac (10)	030 Cathedral	4	15	7	.	2		..		4	15	7		3	4	6		3	4	6		2	2	5	
	029 Gilmore	4	15	7	.	4		..		3	4	5		3	4	5		3	4	4		2	2	2	
TOTAL				14		6	32	30	70			12	25			11	15			10	15			7	8
Bayview (11)	015 Dicks Pk.	2	2	0	..	1		...		1	.5	0		1	.5	0		1	.5	0		1	.5	0	
	017 Lwr Vlmas	4	15	24	.	10		...		3	4	14		3	4	14		2	2	10		1	.5	4	
	023 Dicks	4	15	8	.	14		...		3	4	6		2	2	6		2	2	6		1	.5	3	
	024 Kalmia	3	4	10	.	5		...		2	2	8		2	2	8		1	.5	6		1	.5	6	
TOTAL				42		30	32	31	56			14	28			14	24			12	16			9	12

* includes an estimated 25% non-compliance rate.

		Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5				Alternative 6			
Trailhead	Proposed Zones	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Day Use Quota - None	78 Zone Capacity (persons)	Current Overnight Quota (persons)	93 Avg # Day Permits (Wkend Day)*	93 High # Day Permits (Wkend Day)*	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)	Opportunity Class	Encounter Standard	Daily Camping Quota (persons)	Daily Day Use Quota (Permits)
Eagle Falls (12)	015 Dicks Pk.	2	2	4	..	3		..		1	.5	2		1	.5	2		1	.5	2		1	.5	2	
	016 Mdl Vel	4	15	43	..	14		..		3	4	32		3	4	32		2	2	16		1	.5	6	
	017 Lwr Vlmas	4	15	28	..	12		..		3	4	22		3	4	22		2	2	14		1	.5	4	
	018 Eagle	4	15	9	..	8		..		4	15	0		4	15	0		3	4	0		2	2	0	
	023 Dicks	4	15	14	..	14		..		3	4	10		2	2	6		2	2	6		1	.5	5	
TOTAL				98		51	122	63	95			66	28			62	28			38	17			17	11
Meeks (13)	003 (Genevieve)	4	15	27	..	27		..		3	4	25		3	4	25		3	4	25		2	2	12	
	004 (Grs Lks)	2	2	4	..	2		..		2	2	4		1	.5	2		1	.5	2		1	.5	2	
	007 (Stny Ridge)	4	15	30	..	30		..		3	4	26		2	2	14		2	2	14		1	.5	6	
	012 Phipps	3	4	5	..	8		..		2	2	4		2	2	4		2	2	4		1	.5	2	
TOTAL				66		67	58	16	29			59	12			45	10			45	10			22	8
General Cr. (14)	002 (PCT)	2	2	10	..	49		..		1	.5	8	2	1	.5	8	7	1	.5	8	7	1	.5	8	7
TOTAL				10		49	30	1	1			8	3			8	3			8	3			8	3
Buck Is. (15)	001(Rckbd Lk)	4	15	14	..	12		..		4	15	14		3	4	13		3	4	13		2	2	6	
	005 (Huth Lk)	2	2	1	..	0		..		1	.5	0		1	.5	0		1	.5	0		1	.5	0	
	006 (Rub. Res)	4	15	12	..	7		..		2	2	8		2	2	8		1	.5	4		2	2	6	
	011 Camper Flat	4	15	5	..	9		..		2	2	5		2	2	5		2	2	5		1	.5	2	
TOTAL				32		28	23	4	4			27	15			26	7			22	5			14	3
	TOTAL			793		713	700	313	567			582	281			495	211			402	165			264	104

* includes an estimated 25% non-compliance rate.

United States Department of Agriculture | Forest Service | Eldorado National Forest | 100 Forni Road
Placerville, CA 95667
(916) 622-5061
(916) 626-4552 (TTY)

File Code: 2320

Date: January 16, 1997

Dear Friend of the Desolation Wilderness:

Enclosed is a copy of the Desolation Wilderness Guidelines Draft Environmental Impact Statement (DEIS) for your review and comment. The Desolation Wilderness is located in the Sierra Nevada, California, and is jointly managed by the Eldorado National Forest and the Lake Tahoe Basin Management Unit (LTBMU). The Desolation Wilderness is one of the most heavily used Wilderness areas for its size. Increasing demand for a Wilderness experience has resulted in heavy impacts in this fragile ecosystem. This analysis addresses numerous issues raised by the public and the Forest Service in management of this special area. The purpose of the proposed Desolation Wilderness Management Guidelines is to develop and implement consistent standards and guidelines across administrative boundaries and to preserve the area's wilderness character while allowing use and enjoyment by visitors in a manner that ensures protection of the area over time.

The DEIS documents the analysis of six alternatives for management of the 63,691 acre Desolation Wilderness. Alternative 1 emphasizes recreation use of the Wilderness. Alternative 2 (No Action) would continue current management of the Desolation. Alternative 3 places an emphasis on enhancement of the primitive recreation experience of users through decreased use in specific areas. Alternative 4 reduces use, with an emphasis on improved wilderness social conditions and physical restoration of ecosystems. Alternative 5 reduces use further and places increased emphasis on resource protection and a return to natural ecosystem conditions. Alternative 6 places the most stringent controls on human influences in order to return the Desolation to its most natural condition. Each alternative would result in the area being managed for a different mix of Opportunity Class conditions under the Limits of Acceptable Change process, a process that has been developed to facilitate planning for Wilderness areas. Each alternative also contains specific direction addressing the various issues which have been raised by the public.

Preferred Alternative

The alternatives display a wide range of options for managing the Desolation. At this time, a preferred alternative has not yet been selected. Based upon public comment received, the preferred alternative and final decision may combine elements of the six alternatives displayed and analyzed in this document. The analysis in this DEIS will lead to a decision that either adopts new management guidelines or continues existing management (No Action). The decision to adopt new management guidelines will result in an amendment to the Land and Resource Management Plans for the Eldorado National Forest and the Lake Tahoe Basin Management Unit, providing consistent direction for management of the Desolation Wilderness.

Comments on the DEIS from interested individuals, organizations, and public agencies will be used in preparing a Final EIS and in making a decision on the management guidelines to be implemented for the Desolation Wilderness. The Notice of Availability of the Draft EIS is expected to be published in the Federal Register, January 24, 1997. Comments must be received or postmarked no later than April 4, 1997. The comment period has been set for longer than the normal 45 days to ensure ample time for interested parties to read and consider the DEIS and provide thoughtful comments that will help make the best decision for the Desolation.

To assist the Forest Service in identifying and responding to your concerns, comments should be a specific as possible. Comments may address either the adequacy of the analysis or the merits of the alternatives discussed, or both. We ask that individuals consider the range of options displayed in the alternatives relative to issues that are important to them and provide comments on which alternative best responds to those specific issues. The final decision may reflect a mix, drawing from more than one alternative for different issues. It is helpful if comments refer to specific pages or chapters of the DEIS.

Comments should be sent to:

Desolation Wilderness Management Guidelines
Eldorado National Forest
100 Forni Road
Placerville, CA 95667

Additional Information and Open House

The Forest Service will conduct an open house on Friday, February 7 from 12:00 noon to 8:00 p.m. and Saturday, February 8 from 8:00 a.m. to 12:00 noon at the Alexandria Room, Best Western Placerville Inn, 6850 Greenleaf Drive, just south of Highway 50 at the Missouri Flat Road exit in Placerville. On Friday, there will be a presentation given from 3:00 to 4:00 p.m., and a facilitated group discussion about the alternatives from 4:00 to 6:00 p.m. On Saturday there will be a presentation from 9:00 to 10:00 a.m. and a facilitated group discussion from 10:00 a.m. to 12:00 noon. For the remainder of the open house, individuals may view displays on the various alternatives. Forest Service representatives will be available to answer questions or discuss the various alternatives. An additional open house will be held on Saturday, February 22 from 10:00 a.m. to 4:00 p.m. at the Eldorado County Library, 1000 Rufus Allen Blvd, South Lake Tahoe. A presentation will be given from 11:00 a.m. to 12:00 noon, and there will be a facilitated group discussion about the alternatives from 1:00 to 3:00 p.m. For the remainder of the open house, individuals may view displays and talk with Forest Service representatives.

If you have questions or would like additional information you may contact Diana Erickson at the Eldorado National Forest, (916) 622-5061 or Don Lane at the Lake Tahoe Basin Management Unit, (916) 573-2621.

Sincerely,

JOHN PHIPPS
Forest Supervisor
Eldorado National Forest

ROBERT E. HARRIS
Forest Supervisor
Lake Tahoe Basin Management Unit